# Mathematica 11.3 Integration Test Results

on the problems in the test-suite directory "4 Trig functions\4.2 Cosine"

## Test results for the 294 problems in "4.2.0 (a cos)^m (b trg)^n.m"

- **Problem 1: Result more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[a+b\,x]\,dx$$

Optimal (type 3, 10 leaves, 1 step):

$$\frac{\mathrm{Sin}[a+b\,x]}{b}$$

Result (type 3, 21 leaves):

$$\frac{\mathrm{Cos}[b\,x]\,\mathrm{Sin}[a]}{b}+\frac{\mathrm{Cos}[a]\,\mathrm{Sin}[b\,x]}{b}$$

- **Problem 42: Result more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{a\,\mathrm{Cos}[x]^2}}\,dx$$

Optimal (type 3, 16 leaves, 2 steps):

$$\frac{\mathrm{ArcTanh}[\mathrm{Sin}[x]]\,\mathrm{Cos}[x]}{\sqrt{a\,\mathrm{Cos}[x]^2}}$$

Result (type 3, 46 leaves):

$$\frac{\mathrm{Cos}[x]\,\left(-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{x}{2}\right]-\mathrm{Sin}\left[\frac{x}{2}\right]\right]+\mathrm{Log}\left[\mathrm{Cos}\left[\frac{x}{2}\right]+\mathrm{Sin}\left[\frac{x}{2}\right]\right]\right)}{\sqrt{a\,\mathrm{Cos}[x]^2}}$$

## Problem 43: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\left(a\,\text{Cos}[x]^2\right)^{3/2}}\,dx$$

Optimal (type 3, 42 leaves, 3 steps):

$$\frac{\text{ArcTanh}[\text{Sin}[x]]\,\text{Cos}[x]}{2\,a\,\sqrt{a\,\text{Cos}[x]^2}}+\frac{\text{Tan}[x]}{2\,a\,\sqrt{a\,\text{Cos}[x]^2}}$$

Result (type 3, 91 leaves):

$$-\frac{\text{Cos}[x]\,\left(\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]+\text{Cos}[2\,x]\,\left(\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]\right)-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]-2\,\text{Sin}[x]\right)}{4\,\left(a\,\text{Cos}[x]^2\right)^{3/2}}$$

## Problem 145: Result more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{b\,\text{Cos}[c+d\,x]}}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 33 leaves, 2 steps):

$$\frac{\text{ArcTanh}[\text{Sin}[c+d\,x]]\,\sqrt{b\,\text{Cos}[c+d\,x]}}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 75 leaves):

$$\frac{\sqrt{b\,\text{Cos}[c+d\,x]}\,\left(-\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

## Problem 155: Result more than twice size of optimal antiderivative.

$$\int \frac{(b\,\text{Cos}[c+d\,x])^{3/2}}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 34 leaves, 2 steps):

$$\frac{b\,\text{ArcTanh}[\text{Sin}[c+d\,x]]\,\sqrt{b\,\text{Cos}[c+d\,x]}}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 75 leaves):

$$\frac{(b\,\text{Cos}[c+d\,x])^{3/2}\,\left(-\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)}{d\,\text{Cos}[c+d\,x]^{3/2}}$$

## Problem 166: Result more than twice size of optimal antiderivative.

$$\int \frac{(b \cos[c + d x])^{5/2}}{\cos[c + d x]^{7/2}} \, dx$$

Optimal (type 3, 36 leaves, 2 steps):

$$\frac{b^2 \operatorname{ArcTanh}[\sin[c + d x]] \sqrt{b \cos[c + d x]}}{d \sqrt{\cos[c + d x]}}$$

Result (type 3, 75 leaves):

$$\frac{(b \cos[c + d x])^{5/2} \left(-\operatorname{Log}\left[\cos\left[\frac{1}{2} (c + d x)\right] - \sin\left[\frac{1}{2} (c + d x)\right]\right] + \operatorname{Log}\left[\cos\left[\frac{1}{2} (c + d x)\right] + \sin\left[\frac{1}{2} (c + d x)\right]\right]\right)}{d \cos[c + d x]^{5/2}}$$

## Problem 177: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{\cos[c + d x]} \sqrt{b \cos[c + d x]}} \, dx$$

Optimal (type 3, 33 leaves, 2 steps):

$$\frac{\operatorname{ArcTanh}[\sin[c + d x]] \sqrt{\cos[c + d x]}}{d \sqrt{b \cos[c + d x]}}$$

Result (type 3, 75 leaves):

$$\frac{\sqrt{\cos[c + d x]} \left(-\operatorname{Log}\left[\cos\left[\frac{1}{2} (c + d x)\right] - \sin\left[\frac{1}{2} (c + d x)\right]\right] + \operatorname{Log}\left[\cos\left[\frac{1}{2} (c + d x)\right] + \sin\left[\frac{1}{2} (c + d x)\right]\right]\right)}{d \sqrt{b \cos[c + d x]}}$$

## Problem 187: Result more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{\cos[c + d x]}}{(b \cos[c + d x])^{3/2}} \, dx$$

Optimal (type 3, 36 leaves, 2 steps):

$$\frac{\operatorname{ArcTanh}[\sin[c + d x]] \sqrt{\cos[c + d x]}}{b d \sqrt{b \cos[c + d x]}}$$

Result (type 3, 75 leaves):

$$\frac{\cos[c + d x]^{3/2} \left(-\operatorname{Log}\left[\cos\left[\frac{1}{2} (c + d x)\right] - \sin\left[\frac{1}{2} (c + d x)\right]\right] + \operatorname{Log}\left[\cos\left[\frac{1}{2} (c + d x)\right] + \sin\left[\frac{1}{2} (c + d x)\right]\right]\right)}{d (b \cos[c + d x])^{3/2}}$$

- **Problem 197: Result more than twice size of optimal antiderivative.**

$$\int \frac{\cos[c+d x]^{3/2}}{(b \cos[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 36 leaves, 2 steps):

$$\frac{\text{ArcTanh}[\sin[c+d x]] \sqrt{\cos[c+d x]}}{b^2 d \sqrt{b \cos[c+d x]}}$$

Result (type 3, 78 leaves):

$$\frac{\sqrt{\cos[c+d x]} \left(-\text{Log}\left[\cos\left[\frac{1}{2} (c+d x)\right]-\sin\left[\frac{1}{2} (c+d x)\right]\right]+\text{Log}\left[\cos\left[\frac{1}{2} (c+d x)\right]+\sin\left[\frac{1}{2} (c+d x)\right]\right]\right)}{b^2 d \sqrt{b \cos[c+d x]}}$$

- **Problem 284: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \cos[e+f x]^m \csc[e+f x]^n \, dx$$

Optimal (type 5, 85 leaves, 2 steps):

$$\frac{\cos[e+f x]^{-1+m} \left(\cos[e+f x]^2\right)^{\frac{1-m}{2}} \csc[e+f x]^{-1+n} \text{Hypergeometric2F1}\left[\frac{1-m}{2}, \frac{1-n}{2}, \frac{3-n}{2}, \sin[e+f x]^2\right]}{f (1-n)}$$

Result (type 6, 3229 leaves):

$$-\left(\left(2 (-3+n) \text{AppellF1}\left[\frac{1}{2}-\frac{n}{2}, -m, 1+m-n, \frac{3}{2}-\frac{n}{2}, \tan\left[\frac{1}{2} (e+f x)\right]^2, -\tan\left[\frac{1}{2} (e+f x)\right]^2\right]\right.\right.$$

$$\left.\left(\cos\left[\frac{1}{2} (e+f x)\right]^2\right)^{1+m} \cos[e+f x]^m \csc[e+f x]^{2 n} \left(\cos[e+f x] \sec\left[\frac{1}{2} (e+f x)\right]^2\right)^m \tan\left[\frac{1}{2} (e+f x)\right]\right) \Big/$$

$$\left(f (-1+n) \left((-3+n) \text{AppellF1}\left[\frac{1}{2}-\frac{n}{2}, -m, 1+m-n, \frac{3}{2}-\frac{n}{2}, \tan\left[\frac{1}{2} (e+f x)\right]^2, -\tan\left[\frac{1}{2} (e+f x)\right]^2\right]+\right.\right.$$

$$2 \left(m \text{AppellF1}\left[\frac{3}{2}-\frac{n}{2}, 1-m, 1+m-n, \frac{5}{2}-\frac{n}{2}, \tan\left[\frac{1}{2} (e+f x)\right]^2, -\tan\left[\frac{1}{2} (e+f x)\right]^2\right]+\right.$$

$$\left.\left.(1+m-n) \text{AppellF1}\left[\frac{3}{2}-\frac{n}{2}, -m, 2+m-n, \frac{5}{2}-\frac{n}{2}, \tan\left[\frac{1}{2} (e+f x)\right]^2, -\tan\left[\frac{1}{2} (e+f x)\right]^2\right]\right) \tan\left[\frac{1}{2} (e+f x)\right]^2\right)$$

$$\left(-\left(\left((-3+n) \text{AppellF1}\left[\frac{1}{2}-\frac{n}{2}, -m, 1+m-n, \frac{3}{2}-\frac{n}{2}, \tan\left[\frac{1}{2} (e+f x)\right]^2, -\tan\left[\frac{1}{2} (e+f x)\right]^2\right] \left(\cos\left[\frac{1}{2} (e+f x)\right]^2\right)^{1+m} \csc[e+f x]^n\right.\right.\right.$$

$$\left.\sec\left[\frac{1}{2} (e+f x)\right]^2 \left(\cos[e+f x] \sec\left[\frac{1}{2} (e+f x)\right]^2\right)^m\right) \Big/ \left((-1+n) \left((-3+n) \text{AppellF1}\left[\frac{1}{2}-\frac{n}{2}, -m, 1+m-n, \frac{3}{2}-\frac{n}{2}, \tan\left[\frac{1}{2} (e+f x)\right]^2,\right.\right.\right.$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.$$

$$(1+m-n)\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)\Big)\Big)+$$

$$\Big(2(1+m)(-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^m$$

$$\text{Csc}[e+f x]^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Sin}\left[\frac{1}{2}(e+f x)\right]^2\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\Big(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)$$

$$\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)\Big)+$$

$$\Big(2(-3+n)\,n\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}$$

$$\text{Cos}[e+f x]\,\text{Csc}[e+f x]^{1+n}\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\Big(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)$$

$$\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)\Big)-$$

$$\Big(2(-3+n)\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}\text{Csc}[e+f x]^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+f x)\right]$$

$$\Big(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-$$

$$\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Big)\Big)\Big/\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)-$$
$$\left(2m(-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}\right.$$
$$\text{Csc}[e+f x]^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^{-1+m}\text{Tan}\left[\frac{1}{2}(e+f x)\right]$$
$$\left.\left(-\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Sin}[e+f x]+\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\Big/$$
$$\left((-1+n)\left((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.\right.$$
$$2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)+$$
$$\left(2(-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}\right.$$
$$\text{Csc}[e+f x]^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+f x)\right]$$
$$\left(2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\right.\right.\right.$$
$$\left.\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+(-3+n)\left(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\right.\right.$$
$$\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)$$
$$\left.\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+$$
$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\left(m\left(-\frac{1}{\frac{5}{2}-\frac{n}{2}}(1+m-n)\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},1-m,2+m-n,\frac{7}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right.\right.$$
$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{\frac{5}{2}-\frac{n}{2}}(1-m)\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},2-m,1+m-n,\frac{7}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Bigg)+(1+m-n)\Bigg(-\frac{1}{\frac{5}{2}-\frac{n}{2}}m\Big(\frac{3}{2}-\frac{n}{2}\Big)\,\text{AppellF1}\Big[\frac{5}{2}-\frac{n}{2},\,1-m,$$

$$2+m-n,\,\frac{7}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]-\frac{1}{\frac{5}{2}-\frac{n}{2}}(2+m-n)\Big(\frac{3}{2}-\frac{n}{2}\Big)$$

$$\text{AppellF1}\Big[\frac{5}{2}-\frac{n}{2},\,-m,\,3+m-n,\,\frac{7}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg((-1+n)\Bigg((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$2\Bigg(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,1-m,\,1+m-n,\,\frac{5}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$(1+m-n)\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,-m,\,2+m-n,\,\frac{5}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Bigg)^2\Bigg)\Bigg)\Bigg)\Bigg)$$

- **Problem 285: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a\,\text{Cos}[e+f x])^m\,\text{Csc}[e+f x]^n\,dx$$

Optimal (type 5, 88 leaves, 2 steps):

$$\frac{1}{f(1-n)}a\,(a\,\text{Cos}[e+f x])^{-1+m}\left(\text{Cos}[e+f x]^2\right)^{\frac{1-m}{2}}\text{Csc}[e+f x]^{-1+n}\,\text{Hypergeometric2F1}\Big[\frac{1-m}{2},\,\frac{1-n}{2},\,\frac{3-n}{2},\,\text{Sin}[e+f x]^2\Big]$$

Result (type 6, 3231 leaves):

$$-\Bigg(\Bigg(\Bigg(2(-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]$$

$$\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}(a\,\text{Cos}[e+f x])^m\,\text{Csc}[e+f x]^{2n}\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Bigg)\Bigg/$$

$$\Bigg(f(-1+n)\Bigg((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$2\Bigg(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,1-m,\,1+m-n,\,\frac{5}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$(1+m-n)\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,-m,\,2+m-n,\,\frac{5}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Bigg)$$

$$\Bigg(-\Bigg(\Bigg((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}\,\text{Csc}[e+f x]^n$$

$$\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\Big)\Big/\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+2\Big(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$(1+m-n)\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)+$$

$$\Big(2(1+m)(-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m$$

$$\text{Csc}[e+f x]^n\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\,\text{Sin}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$2\Big(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+(1+m-n)$$

$$\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)+$$

$$\Big(2(-3+n)\,n\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}$$

$$\text{Cos}[e+f x]\,\text{Csc}[e+f x]^{1+n}\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$2\Big(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+(1+m-n)$$

$$\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)-$$

$$\Big(2(-3+n)\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}\,\text{Csc}[e+f x]^n\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]$$

$$\Big(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\Big(\frac{1}{2}-\frac{n}{2}\Big)\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]-$$

$$\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)\Big(\frac{1}{2}-\frac{n}{2}\Big)\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2$$

$$\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg) \Big/ \Bigg((-1+n)\Bigg((-3+n)\,\mathrm{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$
$$2\Bigg(m\,\mathrm{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)$$
$$\mathrm{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Bigg)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)-$$
$$\Bigg(2m(-3+n)\,\mathrm{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\mathrm{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}$$
$$\mathrm{Csc}[e+f x]^n\left(\mathrm{Cos}[e+f x]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^{-1+m}\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]$$
$$\left(-\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Sin}[e+f x]+\mathrm{Cos}[e+f x]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\Bigg)\Big/$$
$$\Bigg((-1+n)\Bigg((-3+n)\,\mathrm{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$
$$2\Bigg(m\,\mathrm{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)$$
$$\mathrm{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Bigg)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)+$$
$$\Bigg(2(-3+n)\,\mathrm{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\mathrm{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}$$
$$\mathrm{Csc}[e+f x]^n\left(\mathrm{Cos}[e+f x]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^{m}\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]$$
$$\Bigg(2\Bigg(m\,\mathrm{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)\,\mathrm{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,$$
$$\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]\Bigg)\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]+(-3+n)\Bigg(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\left(\frac{1}{2}-\frac{n}{2}\right)\mathrm{AppellF1}\Big[$$
$$\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)$$
$$\left(\frac{1}{2}-\frac{n}{2}\right)\mathrm{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+$$
$$2\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg(m\Bigg(-\frac{1}{\frac{5}{2}-\frac{n}{2}}(1+m-n)\left(\frac{3}{2}-\frac{n}{2}\right)\mathrm{AppellF1}\left[\frac{5}{2}-\frac{n}{2},1-m,2+m-n,\frac{7}{2}-\frac{n}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]$$

$$\mathrm{Sec}\Big[\frac{1}{2}(e+f\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]+\frac{1}{\frac{5}{2}-\frac{n}{2}}(1-m)\Big(\frac{3}{2}-\frac{n}{2}\Big)\,\mathrm{AppellF1}\Big[\frac{5}{2}-\frac{n}{2},\,2-m,\,1+m-n,\,\frac{7}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,$$

$$-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]\,\mathrm{Sec}\Big[\frac{1}{2}(e+f\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]\Big)+(1+m-n)\Big(-\frac{1}{\frac{5}{2}-\frac{n}{2}}m\Big(\frac{3}{2}-\frac{n}{2}\Big)\,\mathrm{AppellF1}\Big[\frac{5}{2}-\frac{n}{2},\,1-m,$$

$$2+m-n,\,\frac{7}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]\,\mathrm{Sec}\Big[\frac{1}{2}(e+f\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]-\frac{1}{\frac{5}{2}-\frac{n}{2}}(2+m-n)\Big(\frac{3}{2}-\frac{n}{2}\Big)$$

$$\mathrm{AppellF1}\Big[\frac{5}{2}-\frac{n}{2},\,-m,\,3+m-n,\,\frac{7}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]\,\mathrm{Sec}\Big[\frac{1}{2}(e+f\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\mathrm{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]+$$

$$2\Big(m\,\mathrm{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,1-m,\,1+m-n,\,\frac{5}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]+$$

$$(1+m-n)\,\mathrm{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,-m,\,2+m-n,\,\frac{5}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]\Big)\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big)^2\Big)\Big)\Big)\Big)$$

- **Problem 286: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[e+f\,x]^m\,(b\,\mathrm{Csc}[e+f\,x])^n\,dx$$

Optimal (type 5, 88 leaves, 2 steps):

$$\frac{1}{f(1-n)}b\,\mathrm{Cos}[e+f\,x]^{-1+m}\,\big(\mathrm{Cos}[e+f\,x]^2\big)^{\frac{1-m}{2}}\,(b\,\mathrm{Csc}[e+f\,x])^{-1+n}\,\mathrm{Hypergeometric2F1}\Big[\frac{1-m}{2},\,\frac{1-n}{2},\,\frac{3-n}{2},\,\mathrm{Sin}[e+f\,x]^2\Big]$$

Result (type 6, 3237 leaves):

$$-\Big(\Big(2(-3+n)\,\mathrm{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]$$

$$\Big(\mathrm{Cos}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big)^{1+m}\,\mathrm{Cos}[e+f\,x]^m\,\mathrm{Csc}[e+f\,x]^n\,(b\,\mathrm{Csc}[e+f\,x])^n\,\Big(\mathrm{Cos}[e+f\,x]\,\mathrm{Sec}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big)^m\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]\Big)\Big/$$

$$\Big(f(-1+n)\Big((-3+n)\,\mathrm{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]+$$

$$2\Big(m\,\mathrm{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,1-m,\,1+m-n,\,\frac{5}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]+$$

$$(1+m-n)\,\mathrm{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},\,-m,\,2+m-n,\,\frac{5}{2}-\frac{n}{2},\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big]\Big)\,\mathrm{Tan}\Big[\frac{1}{2}(e+f\,x)\Big]^2\Big)$$

$$\Bigg(-\Bigg(\bigg(\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}\text{Csc}[e+f x]^n$$

$$\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\Big)\Big/\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+2\Big(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$(1+m-n)\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)\bigg)+$$

$$\Big(2(1+m)(-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m$$

$$\text{Csc}[e+f x]^n\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\text{Sin}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$2\Big(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+(1+m-n)$$

$$\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)+$$

$$\Big(2(-3+n)\,n\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}$$

$$\text{Cos}[e+f x]\,\text{Csc}[e+f x]^{1+n}\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big)\Big/$$

$$\Big((-1+n)\Big((-3+n)\,\text{AppellF1}\Big[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+$$

$$2\Big(m\,\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]+(1+m-n)$$

$$\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)-$$

$$\Big(2(-3+n)\Big(\text{Cos}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^{1+m}\text{Csc}[e+f x]^n\Big(\text{Cos}[e+f x]\,\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^m\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]$$

$$\Big(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\Big(\frac{1}{2}-\frac{n}{2}\Big)\text{AppellF1}\Big[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]-$$

$$\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\right)\Big/\left((-1+n)\left((-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+\right.\right.$$

$$2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+(1+m-n)\right.$$

$$\left.\left.\left.\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\right)-$$

$$\left(2m(-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+fx)\right]^2\right)^{1+m}\right.$$

$$\text{Csc}[e+fx]^n\left(\text{Cos}[e+fx]\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\right)^{-1+m}\text{Tan}\left[\frac{1}{2}(e+fx)\right]$$

$$\left.\left.\left(-\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Sin}[e+fx]+\text{Cos}[e+fx]\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\right)\right)\Big/$$

$$\left((-1+n)\left((-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+\right.\right.$$

$$2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+(1+m-n)\right.$$

$$\left.\left.\left.\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\right)+$$

$$\left(2(-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+fx)\right]^2\right)^{1+m}\right.$$

$$\text{Csc}[e+fx]^n\left(\text{Cos}[e+fx]\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+fx)\right]$$

$$\left(2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+(1+m-n)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\right.\right.\right.$$

$$\left.\left.\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+(-3+n)\left(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\right.\right.$$

$$\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]-\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)$$

$$\left.\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2 \Bigg(m \Bigg(-\frac{1}{\frac{5}{2}-\frac{n}{2}}(1+m-n)\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},1-m,2+m-n,\frac{7}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{\frac{5}{2}-\frac{n}{2}}(1-m)\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},2-m,1+m-n,\frac{7}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+(1+m-n)\Bigg(-\frac{1}{\frac{5}{2}-\frac{n}{2}}m\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},1-m,\right.$$

$$\left.2+m-n,\frac{7}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{\frac{5}{2}-\frac{n}{2}}(2+m-n)\left(\frac{3}{2}-\frac{n}{2}\right)$$

$$\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},-m,3+m-n,\frac{7}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg((-1+n)\Bigg((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$(1+m-n)\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2\Bigg)\Bigg)\Bigg)\Bigg)$$

- **Problem 287: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int (a\,\text{Cos}[e+f x])^m\,(b\,\text{Csc}[e+f x])^n\,dx$$

Optimal (type 5, 91 leaves, 2 steps):

$$\frac{1}{f(1-n)}a\,b\,(a\,\text{Cos}[e+f x])^{-1+m}\left(\text{Cos}[e+f x]^2\right)^{\frac{1-m}{2}}(b\,\text{Csc}[e+f x])^{-1+n}\,\text{Hypergeometric2F1}\left[\frac{1-m}{2},\frac{1-n}{2},\frac{3-n}{2},\text{Sin}[e+f x]^2\right]$$

Result (type 6, 3239 leaves):

$$-\Bigg(\Bigg(2(-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]$$

$$\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}(a\,\text{Cos}[e+f x])^m\,\text{Csc}[e+f x]^n\,(b\,\text{Csc}[e+f x])^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg/$$

$$\Bigg(f(-1+n)\Bigg((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$(1+m-n)\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)$$

$$\Bigg(-\Bigg(\Bigg((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}\text{Csc}[e+f x]^n$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\Bigg)\Bigg/\Bigg((-1+n)\Bigg((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$(1+m-n)\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)\Bigg)+$$

$$\Bigg(2(1+m)(-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^m$$

$$\text{Csc}[e+f x]^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Sin}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg/$$

$$\Bigg((-1+n)\Bigg((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)$$

$$\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)+$$

$$\Bigg(2(-3+n)\,n\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}$$

$$\text{Cos}[e+f x]\,\text{Csc}[e+f x]^{1+n}\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg/$$

$$\Bigg((-1+n)\Bigg((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+(1+m-n)$$

$$\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)-$$

$$\Bigg(2(-3+n)\left(\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\right)^{1+m}\text{Csc}[e+f x]^n\left(\text{Cos}[e+f x]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right)^m\text{Tan}\left[\frac{1}{2}(e+f x)\right]$$

$$\Bigg(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-$$

$$\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)\Bigg)\Bigg/\Bigg((-1+n)\Bigg((-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+$$

$$2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+(1+m-n)$$

$$\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)\Bigg)-$$

$$\Bigg(2m(-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+fx)\right]^2\right)^{1+m}$$

$$\text{Csc}[e+fx]^n\left(\text{Cos}[e+fx]\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\right)^{-1+m}\text{Tan}\left[\frac{1}{2}(e+fx)\right]$$

$$\left(-\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Sin}[e+fx]+\text{Cos}[e+fx]\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\Bigg)\Bigg/$$

$$\Bigg((-1+n)\Bigg((-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+$$

$$2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+(1+m-n)$$

$$\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)\Bigg)+$$

$$\Bigg(2(-3+n)\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},-m,1+m-n,\frac{3}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(\text{Cos}\left[\frac{1}{2}(e+fx)\right]^2\right)^{1+m}$$

$$\text{Csc}[e+fx]^n\left(\text{Cos}[e+fx]\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\right)^{m}\text{Tan}\left[\frac{1}{2}(e+fx)\right]$$

$$\Bigg(2\Bigg(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+(1+m-n)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\right.$$

$$\left.\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+(-3+n)\Bigg(-\frac{1}{\frac{3}{2}-\frac{n}{2}}m\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\Bigg[$$

$$\frac{3}{2}-\frac{n}{2},1-m,1+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]-\frac{1}{\frac{3}{2}-\frac{n}{2}}(1+m-n)$$

$$\left(\frac{1}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},-m,2+m-n,\frac{5}{2}-\frac{n}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2 \left(m \left(-\frac{1}{\frac{5}{2}-\frac{n}{2}}(1+m-n)\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},\,1-m,\,2+m-n,\,\frac{7}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{\frac{5}{2}-\frac{n}{2}}(1-m)\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},\,2-m,\,1+m-n,\,\frac{7}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+(1+m-n)\left(-\frac{1}{\frac{5}{2}-\frac{n}{2}}m\left(\frac{3}{2}-\frac{n}{2}\right)\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},\,1-m,\right.\right.$$

$$\left.2+m-n,\,\frac{7}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{\frac{5}{2}-\frac{n}{2}}(2+m-n)\left(\frac{3}{2}-\frac{n}{2}\right)$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2}-\frac{n}{2},\,-m,\,3+m-n,\,\frac{7}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\Big/$$

$$\left((-1+n)\left((-3+n)\,\text{AppellF1}\left[\frac{1}{2}-\frac{n}{2},\,-m,\,1+m-n,\,\frac{3}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.\right.$$

$$2\left(m\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},\,1-m,\,1+m-n,\,\frac{5}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.$$

$$\left.\left.\left.(1+m-n)\,\text{AppellF1}\left[\frac{3}{2}-\frac{n}{2},\,-m,\,2+m-n,\,\frac{5}{2}-\frac{n}{2},\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big)\Big)\Big)$$

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# Test results for the 189 problems in "4.2.10 (c+d x)^m (a+b cos)^n.m"

- **Problem 31: Result more than twice size of optimal antiderivative.**

$$\int (c+d x)\,\text{Sec}[a+b x]\,dx$$

Optimal (type 4, 75 leaves, 5 steps):

$$-\frac{2\,i\,(c+d x)\,\text{ArcTan}\left[e^{i(a+b x)}\right]}{b}+\frac{i\,d\,\text{PolyLog}\left[2,\,-i\,e^{i(a+b x)}\right]}{b^2}-\frac{i\,d\,\text{PolyLog}\left[2,\,i\,e^{i(a+b x)}\right]}{b^2}$$

Result (type 4, 220 leaves):

$$-\frac{c\,\text{Log}\left[\text{Cos}\left[\frac{a}{2}+\frac{b x}{2}\right]-\text{Sin}\left[\frac{a}{2}+\frac{b x}{2}\right]\right]}{b}+\frac{c\,\text{Log}\left[\text{Cos}\left[\frac{a}{2}+\frac{b x}{2}\right]+\text{Sin}\left[\frac{a}{2}+\frac{b x}{2}\right]\right]}{b}+\frac{1}{b^2}$$
$$d\left(\left(-a+\frac{\pi}{2}-b x\right)\left(\text{Log}\left[1-e^{i\left(-a+\frac{\pi}{2}-b x\right)}\right]-\text{Log}\left[1+e^{i\left(-a+\frac{\pi}{2}-b x\right)}\right]\right)-\left(-a+\frac{\pi}{2}\right)\text{Log}\left[\text{Tan}\left[\frac{1}{2}\left(-a+\frac{\pi}{2}-b x\right)\right]\right]+\right.$$
$$\left.i\left(\text{PolyLog}\left[2,-e^{i\left(-a+\frac{\pi}{2}-b x\right)}\right]-\text{PolyLog}\left[2,e^{i\left(-a+\frac{\pi}{2}-b x\right)}\right]\right)\right)$$

## Problem 33: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^3\,\text{Sec}[a+b x]^2\,dx$$

Optimal (type 4, 114 leaves, 6 steps) :

$$-\frac{i\,(c+d x)^3}{b}+\frac{3 d\,(c+d x)^2\,\text{Log}\left[1+e^{2 i (a+b x)}\right]}{b^2}-\frac{3 i d^2\,(c+d x)\,\text{PolyLog}\left[2,-e^{2 i (a+b x)}\right]}{b^3}+\frac{3 d^3\,\text{PolyLog}\left[3,-e^{2 i (a+b x)}\right]}{2 b^4}+\frac{(c+d x)^3\,\text{Tan}[a+b x]}{b}$$

Result (type 4, 397 leaves) :

$$-\frac{1}{4 b^4}$$
$$d^3 e^{-i a}\left(2 i b^2 x^2\left(2 b e^{2 i a} x+3 i\left(1+e^{2 i a}\right)\text{Log}\left[1+e^{2 i (a+b x)}\right]\right)+6 i b\left(1+e^{2 i a}\right)x\,\text{PolyLog}\left[2,-e^{2 i (a+b x)}\right]-3\left(1+e^{2 i a}\right)\text{PolyLog}\left[3,-e^{2 i (a+b x)}\right]\right)$$
$$\text{Sec}[a]+\frac{3 c^2 d\,\text{Sec}[a]\,(\text{Cos}[a]\,\text{Log}[\text{Cos}[a]\,\text{Cos}[b x]-\text{Sin}[a]\,\text{Sin}[b x]]+b x\,\text{Sin}[a])}{b^2\left(\text{Cos}[a]^2+\text{Sin}[a]^2\right)}+$$
$$\left(3 c d^2\,\text{Csc}[a]\left(b^2 e^{-i\,\text{ArcTan}[\text{Cot}[a]]}x^2-1\Big/\left(\sqrt{1+\text{Cot}[a]^2}\right)\text{Cot}[a]\right.\right.$$
$$\left(i b x\,(-\pi-2\,\text{ArcTan}[\text{Cot}[a]])-\pi\,\text{Log}\left[1+e^{-2 i b x}\right]-2\,(b x-\text{ArcTan}[\text{Cot}[a]])\,\text{Log}\left[1-e^{2 i (b x-\text{ArcTan}[\text{Cot}[a]])}\right]+\pi\,\text{Log}[\text{Cos}[b x]]-\right.$$
$$\left.\left.\left.2\,\text{ArcTan}[\text{Cot}[a]]\,\text{Log}[\text{Sin}[b x-\text{ArcTan}[\text{Cot}[a]]]]+i\,\text{PolyLog}\left[2,e^{2 i (b x-\text{ArcTan}[\text{Cot}[a]])}\right]\right)\right)\text{Sec}[a]\right)\Big/$$
$$\left(b^3\sqrt{\text{Csc}[a]^2\left(\text{Cos}[a]^2+\text{Sin}[a]^2\right)}\right)+\frac{\text{Sec}[a]\,\text{Sec}[a+b x]\left(c^3\,\text{Sin}[b x]+3 c^2 d x\,\text{Sin}[b x]+3 c d^2 x^2\,\text{Sin}[b x]+d^3 x^3\,\text{Sin}[b x]\right)}{b}$$

## Problem 34: Result more than twice size of optimal antiderivative.

$$\int (c+d x)^2\,\text{Sec}[a+b x]^2\,dx$$

Optimal (type 4, 82 leaves, 5 steps) :

$$-\frac{i\,(c+d x)^2}{b}+\frac{2 d\,(c+d x)\,\text{Log}\left[1+e^{2 i (a+b x)}\right]}{b^2}-\frac{i d^2\,\text{PolyLog}\left[2,-e^{2 i (a+b x)}\right]}{b^3}+\frac{(c+d x)^2\,\text{Tan}[a+b x]}{b}$$

Result (type 4, 253 leaves) :

$$\frac{2\,c\,d\,\text{Sec}[a]\,(\text{Cos}[a]\,\text{Log}[\text{Cos}[a]\,\text{Cos}[b\,x]-\text{Sin}[a]\,\text{Sin}[b\,x]]+b\,x\,\text{Sin}[a])}{b^2\,(\text{Cos}[a]^2+\text{Sin}[a]^2)}+\left(d^2\,\text{Csc}[a]\,\left(b^2\,e^{-i\,\text{ArcTan}[\text{Cot}[a]]}\,x^2-1\Big/\left(\sqrt{1+\text{Cot}[a]^2}\right)\text{Cot}[a]\,(i\,b\,x\,(-\pi-2\,\text{ArcTan}[\text{Cot}[a]])-\pi\,\text{Log}\left[1+e^{-2\,i\,b\,x}\right]-2\,(b\,x-\text{ArcTan}[\text{Cot}[a]])\,\text{Log}\left[1-e^{2\,i\,(b\,x-\text{ArcTan}[\text{Cot}[a]])}\right]+\pi\,\text{Log}[\text{Cos}[b\,x]]-2\,\text{ArcTan}[\text{Cot}[a]]\,\text{Log}[\text{Sin}[b\,x-\text{ArcTan}[\text{Cot}[a]]]]+i\,\text{PolyLog}\left[2,\,e^{2\,i\,(b\,x-\text{ArcTan}[\text{Cot}[a]])}\right])\right)\text{Sec}[a]\right)\Big/\left(b^3\,\sqrt{\text{Csc}[a]^2\,(\text{Cos}[a]^2+\text{Sin}[a]^2)}\right)+\frac{\text{Sec}[a]\,\text{Sec}[a+b\,x]\,(c^2\,\text{Sin}[b\,x]+2\,c\,d\,x\,\text{Sin}[b\,x]+d^2\,x^2\,\text{Sin}[b\,x])}{b}$$

## Problem 38: Result more than twice size of optimal antiderivative.

$$\int (c+d\,x)^2\,\text{Sec}[a+b\,x]^3\,dx$$

Optimal (type 4, 193 leaves, 9 steps):

$$-\frac{i\,(c+d\,x)^2\,\text{ArcTan}\left[e^{i\,(a+b\,x)}\right]}{b}+\frac{d^2\,\text{ArcTanh}[\text{Sin}[a+b\,x]]}{b^3}+\frac{i\,d\,(c+d\,x)\,\text{PolyLog}\left[2,\,-i\,e^{i\,(a+b\,x)}\right]}{b^2}-\frac{i\,d\,(c+d\,x)\,\text{PolyLog}\left[2,\,i\,e^{i\,(a+b\,x)}\right]}{b^2}-\frac{d^2\,\text{PolyLog}\left[3,\,-i\,e^{i\,(a+b\,x)}\right]}{b^3}+\frac{d^2\,\text{PolyLog}\left[3,\,i\,e^{i\,(a+b\,x)}\right]}{b^3}-\frac{d\,(c+d\,x)\,\text{Sec}[a+b\,x]}{b^2}+\frac{(c+d\,x)^2\,\text{Sec}[a+b\,x]\,\text{Tan}[a+b\,x]}{2\,b}$$

Result (type 4, 526 leaves):

$$\frac{1}{b^2}\left(-i\,b\,c^2\,\text{ArcTan}\left[e^{i\,(a+b\,x)}\right]-\frac{2\,i\,d^2\,\text{ArcTan}\left[e^{i\,(a+b\,x)}\right]}{b}+b\,c\,d\,x\,\text{Log}\left[1-i\,e^{i\,(a+b\,x)}\right]+\frac{1}{2}\,b\,d^2\,x^2\,\text{Log}\left[1-i\,e^{i\,(a+b\,x)}\right]-b\,c\,d\,x\,\text{Log}\left[1+i\,e^{i\,(a+b\,x)}\right]-\frac{1}{2}\,b\,d^2\,x^2\,\text{Log}\left[1+i\,e^{i\,(a+b\,x)}\right]+i\,d\,(c+d\,x)\,\text{PolyLog}\left[2,\,-i\,e^{i\,(a+b\,x)}\right]-i\,d\,(c+d\,x)\,\text{PolyLog}\left[2,\,i\,e^{i\,(a+b\,x)}\right]-\frac{d^2\,\text{PolyLog}\left[3,\,-i\,e^{i\,(a+b\,x)}\right]}{b}+\frac{d^2\,\text{PolyLog}\left[3,\,i\,e^{i\,(a+b\,x)}\right]}{b}\right)-\frac{d\,(c+d\,x)\,\text{Sec}[a]}{b^2}+\frac{c^2+2\,c\,d\,x+d^2\,x^2}{4\,b\,\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]-\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)^2}+\frac{-c\,d\,\text{Sin}\left[\frac{b\,x}{2}\right]-d^2\,x\,\text{Sin}\left[\frac{b\,x}{2}\right]}{b^2\,\left(\text{Cos}\left[\frac{a}{2}\right]-\text{Sin}\left[\frac{a}{2}\right]\right)\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]-\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)}+\frac{-c^2-2\,c\,d\,x-d^2\,x^2}{4\,b\,\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]+\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)^2}+\frac{c\,d\,\text{Sin}\left[\frac{b\,x}{2}\right]+d^2\,x\,\text{Sin}\left[\frac{b\,x}{2}\right]}{b^2\,\left(\text{Cos}\left[\frac{a}{2}\right]+\text{Sin}\left[\frac{a}{2}\right]\right)\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]+\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)}$$

## Problem 39: Result more than twice size of optimal antiderivative.

$$\int (c+d\,x)\,\text{Sec}[a+b\,x]^3\,dx$$

Optimal (type 4, 117 leaves, 6 steps):

$$-\frac{i\,(c+d\,x)\,\text{ArcTan}\left[e^{i\,(a+b\,x)}\right]}{b}+\frac{i\,d\,\text{PolyLog}\left[2,-i\,e^{i\,(a+b\,x)}\right]}{2\,b^2}-\frac{i\,d\,\text{PolyLog}\left[2,i\,e^{i\,(a+b\,x)}\right]}{2\,b^2}-\frac{d\,\text{Sec}[a+b\,x]}{2\,b^2}+\frac{(c+d\,x)\,\text{Sec}[a+b\,x]\,\text{Tan}[a+b\,x]}{2\,b}$$

Result (type 4, 480 leaves) :

$$-\frac{c\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(a+b\,x)\right]-\text{Sin}\left[\frac{1}{2}(a+b\,x)\right]\right]}{2\,b}+\frac{c\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(a+b\,x)\right]+\text{Sin}\left[\frac{1}{2}(a+b\,x)\right]\right]}{2\,b}+$$

$$\frac{1}{2\,b^2}d\left(\left(-a+\frac{\pi}{2}-b\,x\right)\left(\text{Log}\left[1-e^{i\left(-a+\frac{\pi}{2}-b\,x\right)}\right]-\text{Log}\left[1+e^{i\left(-a+\frac{\pi}{2}-b\,x\right)}\right]\right)-\right.$$

$$\left.\left(-a+\frac{\pi}{2}\right)\text{Log}\left[\text{Tan}\left[\frac{1}{2}\left(-a+\frac{\pi}{2}-b\,x\right)\right]\right]+i\left(\text{PolyLog}\left[2,-e^{i\left(-a+\frac{\pi}{2}-b\,x\right)}\right]-\text{PolyLog}\left[2,e^{i\left(-a+\frac{\pi}{2}-b\,x\right)}\right]\right)\right)+$$

$$\frac{d\,x}{4\,b\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]-\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)^2}-\frac{d\,\text{Sin}\left[\frac{b\,x}{2}\right]}{2\,b^2\left(\text{Cos}\left[\frac{a}{2}\right]-\text{Sin}\left[\frac{a}{2}\right]\right)\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]-\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)}-\frac{d\,x}{4\,b\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]+\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)^2}+$$

$$\frac{d\,\text{Sin}\left[\frac{b\,x}{2}\right]}{2\,b^2\left(\text{Cos}\left[\frac{a}{2}\right]+\text{Sin}\left[\frac{a}{2}\right]\right)\left(\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]+\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right)}+\frac{c}{4\,b\left(\text{Cos}\left[\frac{1}{2}(a+b\,x)\right]-\text{Sin}\left[\frac{1}{2}(a+b\,x)\right]\right)^2}-\frac{c}{4\,b\left(\text{Cos}\left[\frac{1}{2}(a+b\,x)\right]+\text{Sin}\left[\frac{1}{2}(a+b\,x)\right]\right)^2}$$

- **Problem 55: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[a+b\,x]^2}{(c+d\,x)^{9/2}}\,dx$$

Optimal (type 4, 247 leaves, 11 steps) :

$$-\frac{16\,b^2}{105\,d^3\,(c+d\,x)^{3/2}}-\frac{2\,\text{Cos}[a+b\,x]^2}{7\,d\,(c+d\,x)^{7/2}}+\frac{32\,b^2\,\text{Cos}[a+b\,x]^2}{105\,d^3\,(c+d\,x)^{3/2}}+\frac{128\,b^{7/2}\sqrt{\pi}\,\text{Cos}\left[2\,a-\frac{2\,b\,c}{d}\right]\text{FresnelC}\left[\frac{2\sqrt{b}\,\sqrt{c+d\,x}}{\sqrt{d}\,\sqrt{\pi}}\right]}{105\,d^{9/2}}-$$

$$\frac{128\,b^{7/2}\sqrt{\pi}\,\text{FresnelS}\left[\frac{2\sqrt{b}\,\sqrt{c+d\,x}}{\sqrt{d}\,\sqrt{\pi}}\right]\text{Sin}\left[2\,a-\frac{2\,b\,c}{d}\right]}{105\,d^{9/2}}+\frac{8\,b\,\text{Cos}[a+b\,x]\,\text{Sin}[a+b\,x]}{35\,d^2\,(c+d\,x)^{5/2}}-\frac{128\,b^3\,\text{Cos}[a+b\,x]\,\text{Sin}[a+b\,x]}{105\,d^4\,\sqrt{c+d\,x}}$$

Result (type 4, 987 leaves) :

$$-\frac{1}{7\,d\,(c+d\,x)^{7/2}}+$$

$$\frac{1}{2}\Bigg(\mathrm{Cos}[2\,a]\Bigg(-\frac{1}{7\,d}32\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}\mathrm{Cos}\left[\frac{b\,c}{d}\right]\mathrm{Sin}\left[\frac{b\,c}{d}\right]\Bigg(\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{8\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}(c+d\,x)^{7/2}}+\frac{2}{5}\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{4\,\sqrt{2}\,\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}-\frac{2}{3}\Bigg(2\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{\sqrt{2}\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}+\sqrt{2\,\pi}$$

$$\mathrm{FresnelS}\left[\frac{2\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}{\sqrt{\pi}}\right]\Bigg)+\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{2\,\sqrt{2}\,\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}\Bigg)\Bigg)\Bigg)-\frac{1}{7\,d}16\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}\mathrm{Cos}\left[\frac{2\,b\,c}{d}\right]\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{8\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}(c+d\,x)^{7/2}}-$$

$$\frac{2}{5}\Bigg(\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{4\,\sqrt{2}\,\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}+\frac{2}{3}\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{2\,\sqrt{2}\,\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}-2\Bigg(-\sqrt{2\,\pi}\,\mathrm{FresnelC}\left[\frac{2\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}{\sqrt{\pi}}\right]+\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{\sqrt{2}\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)-$$

$$2\,\mathrm{Cos}[a]\,\mathrm{Sin}[a]\Bigg(-\frac{1}{7\,d}16\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}\left(\mathrm{Cos}\left[\frac{b\,c}{d}\right]-\mathrm{Sin}\left[\frac{b\,c}{d}\right]\right)\left(\mathrm{Cos}\left[\frac{b\,c}{d}\right]+\mathrm{Sin}\left[\frac{b\,c}{d}\right]\right)\Bigg(\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{8\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}(c+d\,x)^{7/2}}+$$

$$\frac{2}{5}\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{4\,\sqrt{2}\,\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}-\frac{2}{3}\Bigg(2\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{\sqrt{2}\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}+\sqrt{2\,\pi}\,\mathrm{FresnelS}\left[\frac{2\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}{\sqrt{\pi}}\right]\Bigg)+\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{2\,\sqrt{2}\,\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{7\,d}16\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}\mathrm{Sin}\left[\frac{2\,b\,c}{d}\right]\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{8\,\sqrt{2}\,\left(\frac{b}{d}\right)^{7/2}(c+d\,x)^{7/2}}-\frac{2}{5}\Bigg(\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{4\,\sqrt{2}\,\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}+$$

$$\frac{2}{3}\Bigg(\frac{\mathrm{Cos}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{2\,\sqrt{2}\,\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}-2\Bigg(-\sqrt{2\,\pi}\,\mathrm{FresnelC}\left[\frac{2\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}{\sqrt{\pi}}\right]+\frac{\mathrm{Sin}\left[\frac{2\,b\,(c+d\,x)}{d}\right]}{\sqrt{2}\,\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)$$

## ■ Problem 62: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[a+b\,x]^3}{(c+d\,x)^{7/2}}\,dx$$

Optimal (type 4, 356 leaves, 19 steps):

$$-\frac{16\,b^2\,\text{Cos}[a+b\,x]}{5\,d^3\,\sqrt{c+d\,x}}-\frac{2\,\text{Cos}[a+b\,x]^3}{5\,d\,(c+d\,x)^{5/2}}+\frac{24\,b^2\,\text{Cos}[a+b\,x]^3}{5\,d^3\,\sqrt{c+d\,x}}+\frac{2\,b^{5/2}\,\sqrt{2\,\pi}\,\text{Cos}\left[a-\frac{b\,c}{d}\right]\,\text{FresnelS}\left[\frac{\sqrt{b}\,\sqrt{\frac{2}{\pi}}\,\sqrt{c+d\,x}}{\sqrt{d}}\right]}{5\,d^{7/2}}+$$
$$\frac{6\,b^{5/2}\,\sqrt{6\,\pi}\,\text{Cos}\left[3\,a-\frac{3\,b\,c}{d}\right]\,\text{FresnelS}\left[\frac{\sqrt{b}\,\sqrt{\frac{6}{\pi}}\,\sqrt{c+d\,x}}{\sqrt{d}}\right]}{5\,d^{7/2}}+\frac{6\,b^{5/2}\,\sqrt{6\,\pi}\,\text{FresnelC}\left[\frac{\sqrt{b}\,\sqrt{\frac{6}{\pi}}\,\sqrt{c+d\,x}}{\sqrt{d}}\right]\,\text{Sin}\left[3\,a-\frac{3\,b\,c}{d}\right]}{5\,d^{7/2}}+$$
$$\frac{2\,b^{5/2}\,\sqrt{2\,\pi}\,\text{FresnelC}\left[\frac{\sqrt{b}\,\sqrt{\frac{2}{\pi}}\,\sqrt{c+d\,x}}{\sqrt{d}}\right]\,\text{Sin}\left[a-\frac{b\,c}{d}\right]}{5\,d^{7/2}}+\frac{4\,b\,\text{Cos}[a+b\,x]^2\,\text{Sin}[a+b\,x]}{5\,d^2\,(c+d\,x)^{3/2}}$$

Result (type 4, 1429 leaves):

$$\frac{3}{4}\left(-\text{Sin}[a]\left(\frac{1}{5\,d}2\left(\frac{b}{d}\right)^{5/2}\text{Sin}\left[\frac{b\,c}{d}\right]\left(\frac{\text{Cos}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}-\frac{2}{3}\left(2\left(\frac{\text{Cos}\left[\frac{b\,(c+d\,x)}{d}\right]}{\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}+\sqrt{2\,\pi}\,\text{FresnelS}\left[\sqrt{\frac{b}{d}}\,\sqrt{\frac{2}{\pi}}\,\sqrt{c+d\,x}\right]\right)+\frac{\text{Sin}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}\right)\right)-\frac{1}{5\,d}\right.\right.$$
$$\left.2\left(\frac{b}{d}\right)^{5/2}\text{Cos}\left[\frac{b\,c}{d}\right]\left(\frac{\text{Sin}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}+\frac{2}{3}\left(\frac{\text{Cos}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}-2\left(-\sqrt{2\,\pi}\,\text{FresnelC}\left[\sqrt{\frac{b}{d}}\,\sqrt{\frac{2}{\pi}}\,\sqrt{c+d\,x}\right]+\frac{\text{Sin}\left[\frac{b\,(c+d\,x)}{d}\right]}{\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}\right)\right)\right)\right)+$$
$$\text{Cos}[a]\left(-\frac{1}{5\,d}2\left(\frac{b}{d}\right)^{5/2}\text{Cos}\left[\frac{b\,c}{d}\right]\left(\frac{\text{Cos}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}-\frac{2}{3}\left(2\left(\frac{\text{Cos}\left[\frac{b\,(c+d\,x)}{d}\right]}{\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}+\sqrt{2\,\pi}\,\text{FresnelS}\left[\sqrt{\frac{b}{d}}\,\sqrt{\frac{2}{\pi}}\,\sqrt{c+d\,x}\right]\right)+\frac{\text{Sin}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}\right)\right)-\right.$$
$$\left.\left.\frac{1}{5\,d}2\left(\frac{b}{d}\right)^{5/2}\text{Sin}\left[\frac{b\,c}{d}\right]\left(\frac{\text{Sin}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}+\frac{2}{3}\left(\frac{\text{Cos}\left[\frac{b\,(c+d\,x)}{d}\right]}{\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}-2\left(-\sqrt{2\,\pi}\,\text{FresnelC}\left[\sqrt{\frac{b}{d}}\,\sqrt{\frac{2}{\pi}}\,\sqrt{c+d\,x}\right]+\frac{\text{Sin}\left[\frac{b\,(c+d\,x)}{d}\right]}{\sqrt{\frac{b}{d}}\,\sqrt{c+d\,x}}\right)\right)\right)\right)\right)+$$

$$\frac{1}{4}\Bigg(-\text{Sin}[3\,a]\Bigg(\frac{1}{5\,d}18\sqrt{3}\left(\frac{b}{d}\right)^{5/2}\text{Sin}\left[\frac{3\,b\,c}{d}\right]\Bigg(\frac{\text{Cos}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{9\sqrt{3}\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}-$$

$$\frac{2}{3}\Bigg(2\Bigg(\frac{\text{Cos}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{\sqrt{3}\sqrt{\frac{b}{d}}\sqrt{c+d\,x}}+\sqrt{2\,\pi}\,\text{FresnelS}\left[\sqrt{\frac{b}{d}}\sqrt{\frac{6}{\pi}}\sqrt{c+d\,x}\right]\Bigg)+\frac{\text{Sin}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{3\sqrt{3}\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}\Bigg)\Bigg)-\frac{1}{5\,d}18\sqrt{3}\left(\frac{b}{d}\right)^{5/2}\text{Cos}\left[\frac{3\,b\,c}{d}\right]$$

$$\Bigg(\frac{\text{Sin}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{9\sqrt{3}\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}+\frac{2}{3}\Bigg(\frac{\text{Cos}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{3\sqrt{3}\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}-2\Bigg(-\sqrt{2\,\pi}\,\text{FresnelC}\left[\sqrt{\frac{b}{d}}\sqrt{\frac{6}{\pi}}\sqrt{c+d\,x}\right]+\frac{\text{Sin}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{\sqrt{3}\sqrt{\frac{b}{d}}\sqrt{c+d\,x}}\Bigg)\Bigg)\Bigg)\Bigg)+$$

$$\text{Cos}[3\,a]\Bigg(-\frac{1}{5\,d}18\sqrt{3}\left(\frac{b}{d}\right)^{5/2}\text{Cos}\left[\frac{3\,b\,c}{d}\right]\Bigg(\frac{\text{Cos}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{9\sqrt{3}\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}-$$

$$\frac{2}{3}\Bigg(2\Bigg(\frac{\text{Cos}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{\sqrt{3}\sqrt{\frac{b}{d}}\sqrt{c+d\,x}}+\sqrt{2\,\pi}\,\text{FresnelS}\left[\sqrt{\frac{b}{d}}\sqrt{\frac{6}{\pi}}\sqrt{c+d\,x}\right]\Bigg)+\frac{\text{Sin}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{3\sqrt{3}\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}\Bigg)\Bigg)-\frac{1}{5\,d}18\sqrt{3}\left(\frac{b}{d}\right)^{5/2}\text{Sin}\left[\frac{3\,b\,c}{d}\right]$$

$$\Bigg(\frac{\text{Sin}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{9\sqrt{3}\left(\frac{b}{d}\right)^{5/2}(c+d\,x)^{5/2}}+\frac{2}{3}\Bigg(\frac{\text{Cos}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{3\sqrt{3}\left(\frac{b}{d}\right)^{3/2}(c+d\,x)^{3/2}}-2\Bigg(-\sqrt{2\,\pi}\,\text{FresnelC}\left[\sqrt{\frac{b}{d}}\sqrt{\frac{6}{\pi}}\sqrt{c+d\,x}\right]+\frac{\text{Sin}\left[\frac{3\,b\,(c+d\,x)}{d}\right]}{\sqrt{3}\sqrt{\frac{b}{d}}\sqrt{c+d\,x}}\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)$$

- **Problem 75: Attempted integration timed out after 120 seconds.**

$$\int x\sqrt{\text{Cos}[a+b\,x]}\,dx$$

Optimal (type 9, 14 leaves, 0 steps) :

$$\text{Unintegrable}\left[x\sqrt{\text{Cos}[a+b\,x]}\,,\,x\right]$$

Result (type 1, 1 leaves) :

???

- **Problem 86: Attempted integration timed out after 120 seconds.**

$$\int \frac{x}{\mathrm{Cos}[a+b\,x]^{3/2}}\,dx$$

Optimal (type 9, 54 leaves, 1 step):

$$\frac{4\sqrt{\mathrm{Cos}[a+b\,x]}}{b^2}+\frac{2\,x\,\mathrm{Sin}[a+b\,x]}{b\sqrt{\mathrm{Cos}[a+b\,x]}}-\mathrm{Unintegrable}\left[x\sqrt{\mathrm{Cos}[a+b\,x]},\,x\right]$$

Result (type 1, 1 leaves):

???

- **Problem 129: Result more than twice size of optimal antiderivative.**

$$\int \frac{(c+d\,x)^2}{a+a\,\mathrm{Cos}[e+f\,x]}\,dx$$

Optimal (type 4, 101 leaves, 6 steps):

$$-\frac{i\,(c+d\,x)^2}{a\,f}+\frac{4\,d\,(c+d\,x)\,\mathrm{Log}\left[1+e^{i\,(e+f\,x)}\right]}{a\,f^2}-\frac{4\,i\,d^2\,\mathrm{PolyLog}\left[2,\,-e^{i\,(e+f\,x)}\right]}{a\,f^3}+\frac{(c+d\,x)^2\,\mathrm{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{a\,f}$$

Result (type 4, 454 leaves):

$$\frac{8\,c\,d\,\mathrm{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^2\mathrm{Sec}\left[\frac{e}{2}\right]\left(\mathrm{Cos}\left[\frac{e}{2}\right]\mathrm{Log}\left[\mathrm{Cos}\left[\frac{e}{2}\right]\mathrm{Cos}\left[\frac{f\,x}{2}\right]-\mathrm{Sin}\left[\frac{e}{2}\right]\mathrm{Sin}\left[\frac{f\,x}{2}\right]\right]+\frac{1}{2}\,f\,x\,\mathrm{Sin}\left[\frac{e}{2}\right]\right)}{f^2\,(a+a\,\mathrm{Cos}[e+f\,x])\left(\mathrm{Cos}\left[\frac{e}{2}\right]^2+\mathrm{Sin}\left[\frac{e}{2}\right]^2\right)}+$$

$$\left(8\,d^2\,\mathrm{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^2\mathrm{Csc}\left[\frac{e}{2}\right]\left(\frac{1}{4}\,e^{-i\,\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]}\,f^2\,x^2-1\Big/\left(\sqrt{1+\mathrm{Cot}\left[\frac{e}{2}\right]^2}\right)\mathrm{Cot}\left[\frac{e}{2}\right]\right.\right.$$

$$\left(\frac{1}{2}\,i\,f\,x\left(-\pi-2\,\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]\right)-\pi\,\mathrm{Log}\left[1+e^{-i\,f\,x}\right]-2\left(\frac{f\,x}{2}-\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]\right)\mathrm{Log}\left[1-e^{2\,i\,\left(\frac{f\,x}{2}-\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]\right)}\right]+\right.$$

$$\left.\left.\left.\pi\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{f\,x}{2}\right]\right]-2\,\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]\mathrm{Log}\left[\mathrm{Sin}\left[\frac{f\,x}{2}-\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]\right]\right]+i\,\mathrm{PolyLog}\left[2,\,e^{2\,i\,\left(\frac{f\,x}{2}-\mathrm{ArcTan}\left[\mathrm{Cot}\left[\frac{e}{2}\right]\right]\right)}\right]\right)\right)\mathrm{Sec}\left[\frac{e}{2}\right]\right)\Big/$$

$$\left(f^3\,(a+a\,\mathrm{Cos}[e+f\,x])\sqrt{\mathrm{Csc}\left[\frac{e}{2}\right]^2\left(\mathrm{Cos}\left[\frac{e}{2}\right]^2+\mathrm{Sin}\left[\frac{e}{2}\right]^2\right)}\right)+\frac{2\,\mathrm{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]\mathrm{Sec}\left[\frac{e}{2}\right]\left(c^2\,\mathrm{Sin}\left[\frac{f\,x}{2}\right]+2\,c\,d\,x\,\mathrm{Sin}\left[\frac{f\,x}{2}\right]+d^2\,x^2\,\mathrm{Sin}\left[\frac{f\,x}{2}\right]\right)}{f\,(a+a\,\mathrm{Cos}[e+f\,x])}$$

- **Problem 133: Result more than twice size of optimal antiderivative.**

$$\int \frac{(c+d\,x)^3}{(a+a\,\mathrm{Cos}[e+f\,x])^2}\,dx$$

Optimal (type 4, 271 leaves, 10 steps):

$$-\frac{i\,(c+d\,x)^3}{3\,a^2\,f}+\frac{2\,d\,(c+d\,x)^2\,\text{Log}\left[1+e^{i\,(e+f\,x)}\right]}{a^2\,f^2}+\frac{4\,d^3\,\text{Log}\left[\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]\right]}{a^2\,f^4}-\frac{4\,i\,d^2\,(c+d\,x)\,\text{PolyLog}\left[2,-e^{i\,(e+f\,x)}\right]}{a^2\,f^3}+\frac{4\,d^3\,\text{PolyLog}\left[3,-e^{i\,(e+f\,x)}\right]}{a^2\,f^4}-$$
$$\frac{d\,(c+d\,x)^2\,\text{Sec}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^2}{2\,a^2\,f^2}+\frac{2\,d^2\,(c+d\,x)\,\text{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{a^2\,f^3}+\frac{(c+d\,x)^3\,\text{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{3\,a^2\,f}+\frac{(c+d\,x)^3\,\text{Sec}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^2\,\text{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{6\,a^2\,f}$$

Result (type 4, 1016 leaves):

$$-\frac{1}{3\,f^4\,(a+a\,\text{Cos}[e+f\,x])^2}4\,d^3\,e^{-\frac{i\,e}{2}}\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^4$$
$$\left(i\,f^2\,x^2\,\left(e^{i\,e}\,f\,x+3\,i\,\left(1+e^{i\,e}\right)\,\text{Log}\left[1+e^{i\,(e+f\,x)}\right]\right)+6\,i\,\left(1+e^{i\,e}\right)\,f\,x\,\text{PolyLog}\left[2,-e^{i\,(e+f\,x)}\right]-6\,\left(1+e^{i\,e}\right)\,\text{PolyLog}\left[3,-e^{i\,(e+f\,x)}\right]\right)\,\text{Sec}\left[\frac{e}{2}\right]+$$
$$\frac{16\,d^3\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^4\,\text{Sec}\left[\frac{e}{2}\right]\,\left(\text{Cos}\left[\frac{e}{2}\right]\,\text{Log}\left[\text{Cos}\left[\frac{e}{2}\right]\,\text{Cos}\left[\frac{f\,x}{2}\right]-\text{Sin}\left[\frac{e}{2}\right]\,\text{Sin}\left[\frac{f\,x}{2}\right]\right]+\frac{1}{2}\,f\,x\,\text{Sin}\left[\frac{e}{2}\right]\right)}{f^4\,(a+a\,\text{Cos}[e+f\,x])^2\,\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}+$$
$$\frac{8\,c^2\,d\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^4\,\text{Sec}\left[\frac{e}{2}\right]\,\left(\text{Cos}\left[\frac{e}{2}\right]\,\text{Log}\left[\text{Cos}\left[\frac{e}{2}\right]\,\text{Cos}\left[\frac{f\,x}{2}\right]-\text{Sin}\left[\frac{e}{2}\right]\,\text{Sin}\left[\frac{f\,x}{2}\right]\right]+\frac{1}{2}\,f\,x\,\text{Sin}\left[\frac{e}{2}\right]\right)}{f^2\,(a+a\,\text{Cos}[e+f\,x])^2\,\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}+$$
$$\left(16\,c\,d^2\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^4\,\text{Csc}\left[\frac{e}{2}\right]\,\left(\frac{1}{4}\,e^{-i\,\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]}\,f^2\,x^2-1\Big/\left(\sqrt{1+\text{Cot}\left[\frac{e}{2}\right]^2}\right)\text{Cot}\left[\frac{e}{2}\right]\right.\right.$$
$$\left(\frac{1}{2}\,i\,f\,x\,\left(-\pi-2\,\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)-\pi\,\text{Log}\left[1+e^{-i\,f\,x}\right]-2\,\left(\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)\,\text{Log}\left[1-e^{2\,i\,\left(\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)}\right]+\right.$$
$$\left.\left.\left.\pi\,\text{Log}\left[\text{Cos}\left[\frac{f\,x}{2}\right]\right]-2\,\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\,\text{Log}\left[\text{Sin}\left[\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right]\right]+i\,\text{PolyLog}\left[2,e^{2\,i\,\left(\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)}\right]\right)\right)\,\text{Sec}\left[\frac{e}{2}\right]\right)\Big/$$
$$\left(f^3\,(a+a\,\text{Cos}[e+f\,x])^2\,\sqrt{\text{Csc}\left[\frac{e}{2}\right]^2\,\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}\right)+\frac{1}{3\,f^3\,(a+a\,\text{Cos}[e+f\,x])^2}\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]\,\text{Sec}\left[\frac{e}{2}\right]$$
$$\left(-3\,c^2\,d\,f\,\text{Cos}\left[\frac{f\,x}{2}\right]-6\,c\,d^2\,f\,x\,\text{Cos}\left[\frac{f\,x}{2}\right]-3\,d^3\,f\,x^2\,\text{Cos}\left[\frac{f\,x}{2}\right]-3\,c^2\,d\,f\,\text{Cos}\left[e+\frac{f\,x}{2}\right]-6\,c\,d^2\,f\,x\,\text{Cos}\left[e+\frac{f\,x}{2}\right]-\right.$$
$$3\,d^3\,f\,x^2\,\text{Cos}\left[e+\frac{f\,x}{2}\right]+12\,c\,d^2\,\text{Sin}\left[\frac{f\,x}{2}\right]+3\,c^3\,f^2\,\text{Sin}\left[\frac{f\,x}{2}\right]+12\,d^3\,x\,\text{Sin}\left[\frac{f\,x}{2}\right]+9\,c^2\,d\,f^2\,x\,\text{Sin}\left[\frac{f\,x}{2}\right]+$$
$$9\,c\,d^2\,f^2\,x^2\,\text{Sin}\left[\frac{f\,x}{2}\right]+3\,d^3\,f^2\,x^3\,\text{Sin}\left[\frac{f\,x}{2}\right]-6\,c\,d^2\,\text{Sin}\left[e+\frac{f\,x}{2}\right]-6\,d^3\,x\,\text{Sin}\left[e+\frac{f\,x}{2}\right]+6\,c\,d^2\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+$$
$$\left.c^3\,f^2\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+6\,d^3\,x\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+3\,c^2\,d\,f^2\,x\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+3\,c\,d^2\,f^2\,x^2\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+d^3\,f^2\,x^3\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]\right)$$

- **Problem 134: Result more than twice size of optimal antiderivative.**

$$\int\frac{(c+d\,x)^2}{(a+a\,\text{Cos}[e+f\,x])^2}\,dx$$

Optimal (type 4, 212 leaves, 9 steps):

$$-\frac{i\,(c+d\,x)^2}{3\,a^2\,f}+\frac{4\,d\,(c+d\,x)\,\text{Log}\left[1+e^{i\,(e+f\,x)}\right]}{3\,a^2\,f^2}-\frac{4\,i\,d^2\,\text{PolyLog}\left[2,-e^{i\,(e+f\,x)}\right]}{3\,a^2\,f^3}-\frac{d\,(c+d\,x)\,\text{Sec}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^2}{3\,a^2\,f^2}+\frac{2\,d^2\,\text{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{3\,a^2\,f^3}+\frac{(c+d\,x)^2\,\text{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{3\,a^2\,f}+\frac{(c+d\,x)^2\,\text{Sec}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^2\,\text{Tan}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{6\,a^2\,f}$$

Result (type 4, 619 leaves):

$$\frac{16\,c\,d\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^4\,\text{Sec}\left[\frac{e}{2}\right]\,\left(\text{Cos}\left[\frac{e}{2}\right]\,\text{Log}\left[\text{Cos}\left[\frac{e}{2}\right]\,\text{Cos}\left[\frac{f\,x}{2}\right]-\text{Sin}\left[\frac{e}{2}\right]\,\text{Sin}\left[\frac{f\,x}{2}\right]\right]+\frac{1}{2}\,f\,x\,\text{Sin}\left[\frac{e}{2}\right]\right)}{3\,f^2\,(a+a\,\text{Cos}[e+f\,x])^2\,\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}+$$

$$\left(16\,d^2\,\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]^4\,\text{Csc}\left[\frac{e}{2}\right]\,\left(\frac{1}{4}\,e^{-i\,\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]}\,f^2\,x^2-1\Big/\left(\sqrt{1+\text{Cot}\left[\frac{e}{2}\right]^2}\right)\text{Cot}\left[\frac{e}{2}\right]\right.\right.$$
$$\left(\frac{1}{2}\,i\,f\,x\,\left(-\pi-2\,\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)-\pi\,\text{Log}\left[1+e^{-i\,f\,x}\right]-2\,\left(\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)\,\text{Log}\left[1-e^{2\,i\,\left(\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)}\right]+\right.$$
$$\left.\left.\left.\pi\,\text{Log}\left[\text{Cos}\left[\frac{f\,x}{2}\right]\right]-2\,\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\,\text{Log}\left[\text{Sin}\left[\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right]\right]+i\,\text{PolyLog}\left[2,e^{2\,i\,\left(\frac{f\,x}{2}-\text{ArcTan}\left[\text{Cot}\left[\frac{e}{2}\right]\right]\right)}\right]\right)\right)\text{Sec}\left[\frac{e}{2}\right]\right)\Big/$$
$$\left(3\,f^3\,(a+a\,\text{Cos}[e+f\,x])^2\,\sqrt{\text{Csc}\left[\frac{e}{2}\right]^2\,\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}\right)+\frac{1}{3\,f^3\,(a+a\,\text{Cos}[e+f\,x])^2}\text{Cos}\left[\frac{e}{2}+\frac{f\,x}{2}\right]$$
$$\text{Sec}\left[\frac{e}{2}\right]$$
$$\left(-2\,c\,d\,f\,\text{Cos}\left[\frac{f\,x}{2}\right]-2\,d^2\,f\,x\,\text{Cos}\left[\frac{f\,x}{2}\right]-2\,c\,d\,f\,\text{Cos}\left[e+\frac{f\,x}{2}\right]-2\,d^2\,f\,x\,\text{Cos}\left[e+\frac{f\,x}{2}\right]+4\,d^2\,\text{Sin}\left[\frac{f\,x}{2}\right]+3\,c^2\,f^2\,\text{Sin}\left[\frac{f\,x}{2}\right]+6\,c\,d\,f^2\,x\,\text{Sin}\left[\frac{f\,x}{2}\right]+\right.$$
$$\left.3\,d^2\,f^2\,x^2\,\text{Sin}\left[\frac{f\,x}{2}\right]-2\,d^2\,\text{Sin}\left[e+\frac{f\,x}{2}\right]+2\,d^2\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+c^2\,f^2\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+2\,c\,d\,f^2\,x\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]+d^2\,f^2\,x^2\,\text{Sin}\left[e+\frac{3\,f\,x}{2}\right]\right)$$

## Problem 139: Result more than twice size of optimal antiderivative.

$$\int\frac{(c+d\,x)^2}{a-a\,\text{Cos}[e+f\,x]}\,dx$$

Optimal (type 4, 102 leaves, 6 steps):

$$-\frac{i\,(c+d\,x)^2}{a\,f}-\frac{(c+d\,x)^2\,\text{Cot}\left[\frac{e}{2}+\frac{f\,x}{2}\right]}{a\,f}+\frac{4\,d\,(c+d\,x)\,\text{Log}\left[1-e^{i\,(e+f\,x)}\right]}{a\,f^2}-\frac{4\,i\,d^2\,\text{PolyLog}\left[2,e^{i\,(e+f\,x)}\right]}{a\,f^3}$$

Result (type 4, 447 leaves):

$$\frac{2\,\text{Csc}\left[\frac{e}{2}\right]\left(c^2\,\text{Sin}\left[\frac{f x}{2}\right]+2\,c\,d\,x\,\text{Sin}\left[\frac{f x}{2}\right]+d^2\,x^2\,\text{Sin}\left[\frac{f x}{2}\right]\right)\text{Sin}\left[\frac{e}{2}+\frac{f x}{2}\right]}{f\,(a-a\,\text{Cos}[e+f x])}+$$

$$\frac{8\,c\,d\,\text{Csc}\left[\frac{e}{2}\right]\left(-\frac{1}{2}\,f\,x\,\text{Cos}\left[\frac{e}{2}\right]+\text{Log}\left[\text{Cos}\left[\frac{f x}{2}\right]\text{Sin}\left[\frac{e}{2}\right]+\text{Cos}\left[\frac{e}{2}\right]\text{Sin}\left[\frac{f x}{2}\right]\right]\text{Sin}\left[\frac{e}{2}\right]\right)\text{Sin}\left[\frac{e}{2}+\frac{f x}{2}\right]^2}{f^2\,(a-a\,\text{Cos}[e+f x])\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}-$$

$$\Bigg(8\,d^2\,\text{Csc}\left[\frac{e}{2}\right]\text{Sec}\left[\frac{e}{2}\right]\text{Sin}\left[\frac{e}{2}+\frac{f x}{2}\right]^2\left(\frac{1}{4}\,e^{i\,\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]}\,f^2\,x^2+1\Big/\left(\sqrt{1+\text{Tan}\left[\frac{e}{2}\right]^2}\right)\left(\frac{1}{2}\,i\,f\,x\left(-\pi+2\,\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]\right)-\pi\,\text{Log}\left[1+e^{-i f x}\right]-\right.\right.$$

$$2\left(\frac{f x}{2}+\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]\right)\text{Log}\left[1-e^{2 i\left(\frac{f x}{2}+\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]\right)}\right]+\pi\,\text{Log}\left[\text{Cos}\left[\frac{f x}{2}\right]\right]+2\,\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]\text{Log}\left[\text{Sin}\left[\frac{f x}{2}+\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]\right]\right]+$$

$$\left.\left.i\,\text{PolyLog}\left[2,\,e^{2 i\left(\frac{f x}{2}+\text{ArcTan}\left[\text{Tan}\left[\frac{e}{2}\right]\right]\right)}\right]\right)\text{Tan}\left[\frac{e}{2}\right]\right)\Bigg)\Big/\left(f^3\,(a-a\,\text{Cos}[e+f x])\sqrt{\text{Sec}\left[\frac{e}{2}\right]^2\left(\text{Cos}\left[\frac{e}{2}\right]^2+\text{Sin}\left[\frac{e}{2}\right]^2\right)}\right)$$

- **Problem 172: Result more than twice size of optimal antiderivative.**

$$\int\frac{x}{\sqrt{a+a\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 156 leaves, 6 steps):

$$-\frac{4\,i\,x\,\text{ArcTan}\left[e^{\frac{1}{2} i (c+d x)}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{4\,i\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{PolyLog}\left[2,\,-i\,e^{\frac{1}{2} i (c+d x)}\right]}{d^2\sqrt{a+a\,\text{Cos}[c+d x]}}-\frac{4\,i\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{PolyLog}\left[2,\,i\,e^{\frac{1}{2} i (c+d x)}\right]}{d^2\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 4, 333 leaves):

$$-\frac{1}{d^2\sqrt{a\,(1+\text{Cos}[c+d x])}}\,2\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\left(d\,x\,\text{Log}\left[1-\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right]+2\,i\,\text{Log}\left[1-\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right]\text{Log}\left[\left(\frac{1}{2}+\frac{i}{2}\right)\left(-i+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]-\right.$$

$$2\,i\,\text{Log}\left[1-\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right]\text{Log}\left[\left(\frac{1}{2}-\frac{i}{2}\right)\left(i+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]-d\,x\,\text{Log}\left[1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right]-$$

$$2\,i\,\text{Log}\left[\frac{1}{2}\left((1+i)-(1-i)\,\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]\text{Log}\left[1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right]+2\,i\,\text{Log}\left[\left(-\frac{1}{2}-\frac{i}{2}\right)\left(i+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]$$

$$\text{Log}\left[1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right]+2\,i\,\text{PolyLog}\left[2,\left(-\frac{1}{2}-\frac{i}{2}\right)\left(-1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]-2\,i\,\text{PolyLog}\left[2,\left(-\frac{1}{2}+\frac{i}{2}\right)\left(-1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]-$$

$$\left.2\,i\,\text{PolyLog}\left[2,\left(\frac{1}{2}-\frac{i}{2}\right)\left(1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]+2\,i\,\text{PolyLog}\left[2,\left(\frac{1}{2}+\frac{i}{2}\right)\left(1+\text{Tan}\left[\frac{1}{4}(c+d x)\right]\right)\right]\right)$$

- **Problem 180: Result more than twice size of optimal antiderivative.**

$$\int\frac{x^3}{(a+a\,\text{Cos}[x])^{3/2}}\,dx$$

Optimal (type 4, 423 leaves, 16 steps):

$$-\frac{3x^2}{a\sqrt{a+a\,\text{Cos}[x]}}-\frac{24\,i\,x\,\text{ArcTan}\left[e^{\frac{i x}{2}}\right]\text{Cos}\left[\frac{x}{2}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}-\frac{i\,x^3\,\text{ArcTan}\left[e^{\frac{i x}{2}}\right]\text{Cos}\left[\frac{x}{2}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}+\frac{24\,i\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[2,-i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}+$$

$$\frac{3\,i\,x^2\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[2,-i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}-\frac{24\,i\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[2,i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}-\frac{3\,i\,x^2\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[2,i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}-\frac{12\,x\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[3,-i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}+$$

$$\frac{12\,x\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[3,i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}-\frac{24\,i\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[4,-i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}+\frac{24\,i\,\text{Cos}\left[\frac{x}{2}\right]\text{PolyLog}\left[4,i\,e^{\frac{i x}{2}}\right]}{a\sqrt{a+a\,\text{Cos}[x]}}+\frac{x^3\,\text{Tan}\left[\frac{x}{2}\right]}{2\,a\sqrt{a+a\,\text{Cos}[x]}}$$

Result (type 4, 1391 leaves) :

$$-\frac{6 x^2 \text{Cos}\left[\frac{x}{2}\right]^3}{(a\,(1+\text{Cos}[x]))^{3/2}}+\frac{48 \text{Cos}\left[\frac{x}{2}\right]^3 \left(\frac{1}{2} x \left(\text{Log}\left[1-i\, e^{\frac{i x}{2}}\right]-\text{Log}\left[1+i\, e^{\frac{i x}{2}}\right]\right)+i \left(\text{PolyLog}\left[2,-i\, e^{\frac{i x}{2}}\right]-\text{PolyLog}\left[2,i\, e^{\frac{i x}{2}}\right]\right)\right)}{(a\,(1+\text{Cos}[x]))^{3/2}}+\frac{1}{(a\,(1+\text{Cos}[x]))^{3/2}}$$

$$8 \text{Cos}\left[\frac{x}{2}\right]^3 \left(\frac{1}{8} \pi^3 \text{Log}\left[\text{Cot}\left[\frac{1}{2}\left(\frac{\pi}{2}-\frac{x}{2}\right)\right]\right]+\frac{3}{4} \pi^2 \left(\left(\frac{\pi}{2}-\frac{x}{2}\right)\left(\text{Log}\left[1-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]-\text{Log}\left[1+e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]\right)+i\left(\text{PolyLog}\left[2,-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]-\text{PolyLog}\left[2,e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]\right)\right)-\right.$$

$$\frac{3}{2} \pi \left(\left(\frac{\pi}{2}-\frac{x}{2}\right)^2 \left(\text{Log}\left[1-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]-\text{Log}\left[1+e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]\right)+2 i \left(\frac{\pi}{2}-\frac{x}{2}\right)\left(\text{PolyLog}\left[2,-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]-\text{PolyLog}\left[2,e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]\right)+\right.$$

$$\left.2\left(-\text{PolyLog}\left[3,-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]+\text{PolyLog}\left[3,e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]\right)\right)+8\left(\frac{1}{4} i \left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)^4+\frac{1}{64} i \left(\frac{\pi}{2}-\frac{x}{2}\right)^4-\right.$$

$$\frac{1}{8}\pi^3\left(i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)-\text{Log}\left[1+e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]\right)-\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)^3 \text{Log}\left[1+e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]-\frac{1}{8}\left(\frac{\pi}{2}-\frac{x}{2}\right)^3 \text{Log}\left[1+e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]+$$

$$\frac{3}{4}\pi^2\left(\frac{1}{2} i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)^2-\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)\text{Log}\left[1+e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]+\frac{1}{2} i\, \text{PolyLog}\left[2,-e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]\right)+$$

$$\frac{3}{2} i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)^2 \text{PolyLog}\left[2,-e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]+\frac{3}{8} i\left(\frac{\pi}{2}-\frac{x}{2}\right)^2 \text{PolyLog}\left[2,-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]-$$

$$\frac{3}{2}\pi\left(\frac{1}{3} i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)^3-\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)^2 \text{Log}\left[1+e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]+i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)\text{PolyLog}\left[2,-e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]-\right.$$

$$\left.\frac{1}{2}\text{PolyLog}\left[3,-e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]\right)-\frac{3}{2}\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)\text{PolyLog}\left[3,-e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]-$$

$$\left.\left.\frac{3}{4}\left(\frac{\pi}{2}-\frac{x}{2}\right)\text{PolyLog}\left[3,-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]-\frac{3}{4} i\,\text{PolyLog}\left[4,-e^{2 i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\frac{x}{2}\right)\right)}\right]-\frac{3}{4} i\,\text{PolyLog}\left[4,-e^{i\left(\frac{\pi}{2}-\frac{x}{2}\right)}\right]\right)\right)+$$

$$\frac{x^3 \text{Cos}\left[\frac{x}{2}\right]^3}{2\,(a\,(1+\text{Cos}[x]))^{3/2}\left(\text{Cos}\left[\frac{x}{4}\right]-\text{Sin}\left[\frac{x}{4}\right]\right)^2}-\frac{6 x^2 \text{Cos}\left[\frac{x}{2}\right]^3 \text{Sin}\left[\frac{x}{4}\right]}{(a\,(1+\text{Cos}[x]))^{3/2}\left(\text{Cos}\left[\frac{x}{4}\right]-\text{Sin}\left[\frac{x}{4}\right]\right)}-$$

$$\frac{x^3 \text{Cos}\left[\frac{x}{2}\right]^3}{2\,(a\,(1+\text{Cos}[x]))^{3/2}\left(\text{Cos}\left[\frac{x}{4}\right]+\text{Sin}\left[\frac{x}{4}\right]\right)^2}+$$

$$\frac{6 x^2 \text{Cos}\left[\frac{x}{2}\right]^3 \text{Sin}\left[\frac{x}{4}\right]}{(a\,(1+\text{Cos}[x]))^{3/2}\left(\text{Cos}\left[\frac{x}{4}\right]+\text{Sin}\left[\frac{x}{4}\right]\right)}$$

- **Problem 187: Result more than twice size of optimal antiderivative.**

$$\int \frac{x}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 214 leaves, 8 steps) :

$$-\frac{i\,x\,\text{Log}\left[1+\frac{b\,e^{i\,(c+d\,x)}}{a-\sqrt{a^2-b^2}}\right]}{\sqrt{a^2-b^2}\;d}+\frac{i\,x\,\text{Log}\left[1+\frac{b\,e^{i\,(c+d\,x)}}{a+\sqrt{a^2-b^2}}\right]}{\sqrt{a^2-b^2}\;d}-\frac{\text{PolyLog}\left[2,-\frac{b\,e^{i\,(c+d\,x)}}{a-\sqrt{a^2-b^2}}\right]}{\sqrt{a^2-b^2}\;d^2}+\frac{\text{PolyLog}\left[2,-\frac{b\,e^{i\,(c+d\,x)}}{a+\sqrt{a^2-b^2}}\right]}{\sqrt{a^2-b^2}\;d^2}$$

Result (type 4, 756 leaves) :

$$\frac{1}{\sqrt{-a^2+b^2}\;d^2}\left(2\,(c+d\,x)\,\text{ArcTanh}\left[\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]-2\left(c+\text{ArcCos}\left[-\frac{a}{b}\right]\right)\text{ArcTanh}\left[\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]+\right.$$

$$\left(\text{ArcCos}\left[-\frac{a}{b}\right]-2\,i\,\text{ArcTanh}\left[\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]+2\,i\,\text{ArcTanh}\left[\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]\right)\text{Log}\left[\frac{\sqrt{-a^2+b^2}\;e^{-\frac{1}{2}\,i\,(c+d\,x)}}{\sqrt{2}\,\sqrt{b}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{a}{b}\right]+2\,i\left(\text{ArcTanh}\left[\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]-\text{ArcTanh}\left[\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]\right)\right)\text{Log}\left[\frac{\sqrt{-a^2+b^2}\;e^{\frac{1}{2}\,i\,(c+d\,x)}}{\sqrt{2}\,\sqrt{b}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{a}{b}\right]-2\,i\,\text{ArcTanh}\left[\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]\right)\text{Log}\left[\frac{(a+b)\left(-a+b-i\,\sqrt{-a^2+b^2}\right)\left(1+i\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{b\left(a+b+\sqrt{-a^2+b^2}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{a}{b}\right]+2\,i\,\text{ArcTanh}\left[\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]\right)\text{Log}\left[\frac{(a+b)\left(i\,a-i\,b+\sqrt{-a^2+b^2}\right)\left(i+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{b\left(a+b+\sqrt{-a^2+b^2}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right]+$$

$$\left.i\left(\text{PolyLog}\left[2,\frac{\left(a-i\,\sqrt{-a^2+b^2}\right)\left(a+b-\sqrt{-a^2+b^2}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{b\left(a+b+\sqrt{-a^2+b^2}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right]-\text{PolyLog}\left[2,\frac{\left(a+i\,\sqrt{-a^2+b^2}\right)\left(a+b-\sqrt{-a^2+b^2}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{b\left(a+b+\sqrt{-a^2+b^2}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right]\right)\right)$$

# Test results for the 62 problems in "4.2.1.1 (a+b cos)^n.m"

- **Problem 37: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(3+5\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 140 leaves, 6 steps) :

$$\frac{279\,\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{32\,768\,d}-\frac{279\,\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{32\,768\,d}+\frac{5\,\text{Sin}[c+d\,x]}{48\,d\,(3+5\,\text{Cos}[c+d\,x])^3}-\frac{25\,\text{Sin}[c+d\,x]}{512\,d\,(3+5\,\text{Cos}[c+d\,x])^2}+\frac{995\,\text{Sin}[c+d\,x]}{24\,576\,d\,(3+5\,\text{Cos}[c+d\,x])}$$

Result (type 3, 296 leaves) :

$$\frac{1}{393\,216\,d\,(3+5\,\text{Cos}[c+d\,x])^3}\left(467\,046\,\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+104\,625\,\text{Cos}[3\,(c+d\,x)]\,\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$765\,855\,\text{Cos}[c+d\,x]\left(\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+$$
$$376\,650\,\text{Cos}[2\,(c+d\,x)]\left(\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)-$$
$$467\,046\,\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-104\,625\,\text{Cos}[3\,(c+d\,x)]\,\text{Log}\left[2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$\left.226\,140\,\text{Sin}[c+d\,x]+190\,800\,\text{Sin}[2\,(c+d\,x)]+99\,500\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 41: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(3-5\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 138 leaves, 6 steps) :

$$-\frac{279\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{32\,768\,d}+\frac{279\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{32\,768\,d}-\frac{5\,\text{Sin}[c+d\,x]}{48\,d\,(3-5\,\text{Cos}[c+d\,x])^3}+\frac{25\,\text{Sin}[c+d\,x]}{512\,d\,(3-5\,\text{Cos}[c+d\,x])^2}-\frac{995\,\text{Sin}[c+d\,x]}{24\,576\,d\,(3-5\,\text{Cos}[c+d\,x])}$$

Result (type 3, 288 leaves) :

$$\frac{1}{393216\, d\, (-3+5\,\text{Cos}[c+d\,x])^3}\Bigg(467046\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-104625\,\text{Cos}[3\,(c+d\,x)]\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-$$
$$765855\,\text{Cos}[c+d\,x]\Big(\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]\Big)+$$
$$376650\,\text{Cos}[2\,(c+d\,x)]\Big(\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]\Big)-$$
$$467046\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]+104625\,\text{Cos}[3\,(c+d\,x)]\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]+$$
$$226140\,\text{Sin}[c+d\,x]-190800\,\text{Sin}[2\,(c+d\,x)]+99500\,\text{Sin}[3\,(c+d\,x)]\Bigg)$$

- **Problem 45: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(-3+5\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 138 leaves, 6 steps):

$$-\frac{279\,\text{Log}\big[\text{Cos}\big[\frac{1}{2}(c+d\,x)\big]-2\,\text{Sin}\big[\frac{1}{2}(c+d\,x)\big]\big]}{32768\,d}+\frac{279\,\text{Log}\big[\text{Cos}\big[\frac{1}{2}(c+d\,x)\big]+2\,\text{Sin}\big[\frac{1}{2}(c+d\,x)\big]\big]}{32768\,d}-$$
$$\frac{5\,\text{Sin}[c+d\,x]}{48\,d\,(3-5\,\text{Cos}[c+d\,x])^3}+\frac{25\,\text{Sin}[c+d\,x]}{512\,d\,(3-5\,\text{Cos}[c+d\,x])^2}-\frac{995\,\text{Sin}[c+d\,x]}{24576\,d\,(3-5\,\text{Cos}[c+d\,x])}$$

Result (type 3, 288 leaves):

$$\frac{1}{393216\, d\, (-3+5\,\text{Cos}[c+d\,x])^3}\Bigg(467046\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-104625\,\text{Cos}[3\,(c+d\,x)]\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-$$
$$765855\,\text{Cos}[c+d\,x]\Big(\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]\Big)+$$
$$376650\,\text{Cos}[2\,(c+d\,x)]\Big(\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]-2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]-\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]\Big)-$$
$$467046\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]+104625\,\text{Cos}[3\,(c+d\,x)]\,\text{Log}\Big[\text{Cos}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]\Big]+$$
$$226140\,\text{Sin}[c+d\,x]-190800\,\text{Sin}[2\,(c+d\,x)]+99500\,\text{Sin}[3\,(c+d\,x)]\Bigg)$$

- **Problem 49: Result more than twice size of optimal antiderivative.**

$$\int \frac{1}{(-3-5\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 140 leaves, 6 steps):

$$\frac{279\,\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{32\,768\,d}-\frac{279\,\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{32\,768\,d}+\frac{5\,\mathrm{Sin}[c+d\,x]}{48\,d\,(3+5\,\mathrm{Cos}[c+d\,x])^3}-\frac{25\,\mathrm{Sin}[c+d\,x]}{512\,d\,(3+5\,\mathrm{Cos}[c+d\,x])^2}+\frac{995\,\mathrm{Sin}[c+d\,x]}{24\,576\,d\,(3+5\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 296 leaves):

$$\frac{1}{393\,216\,d\,(3+5\,\mathrm{Cos}[c+d\,x])^3}\Bigg(467\,046\,\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+104\,625\,\mathrm{Cos}[3\,(c+d\,x)]\,\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$765\,855\,\mathrm{Cos}[c+d\,x]\left(\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+$$
$$376\,650\,\mathrm{Cos}[2\,(c+d\,x)]\left(\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)-$$
$$467\,046\,\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-104\,625\,\mathrm{Cos}[3\,(c+d\,x)]\,\mathrm{Log}\left[2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$226\,140\,\mathrm{Sin}[c+d\,x]+190\,800\,\mathrm{Sin}[2\,(c+d\,x)]+99\,500\,\mathrm{Sin}[3\,(c+d\,x)]\Bigg)$$

- **Problem 56: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{4/3}\,dx$$

Optimal (type 6, 108 leaves, 3 steps):

$$\left(\sqrt{2}\,(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2},-\frac{4}{3},\frac{3}{2},\frac{1}{2}\,(1-\mathrm{Cos}[c+d\,x]),\frac{b\,(1-\mathrm{Cos}[c+d\,x])}{a+b}\right]\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Sin}[c+d\,x]\right)\Bigg/\left(d\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,\left(\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right)^{1/3}\right)$$

Result (type 6, 246 leaves):

$$-\frac{1}{16\,b\,d}3\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Csc}[c+d\,x]\left(4\,(-a^2+b^2)\,\mathrm{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a-b},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right]\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\sqrt{-\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{a-b}}+5\,a\,\mathrm{AppellF1}\left[\frac{4}{3},\frac{1}{2},\frac{1}{2},\frac{7}{3},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a-b},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right]\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\sqrt{-\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{a-b}}\,(a+b\,\mathrm{Cos}[c+d\,x])-4\,b^2\,\mathrm{Sin}[c+d\,x]^2\right)$$

- **Problem 61: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])^{4/3}}\,dx$$

Optimal (type 6, 110 leaves, 3 steps):

$$\frac{\sqrt{2}\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2},\frac{4}{3},\frac{3}{2},\frac{1}{2}\,(1-\mathrm{Cos}[c+d\,x]),\frac{b\,(1-\mathrm{Cos}[c+d\,x])}{a+b}\right]\left(\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right)^{1/3}\mathrm{Sin}[c+d\,x]}{(a+b)\,d\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}}$$

Result (type 6, 268 leaves):

$$\left(15\,a\,\mathrm{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a-b},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right]\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\sqrt{-\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{a-b}}\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c+d\,x]-6\left(5\,b^2+2\,\mathrm{AppellF1}\left[\frac{5}{3},\frac{1}{2},\frac{1}{2},\frac{8}{3},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a-b},\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right]\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\sqrt{\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{-a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c+d\,x]^2\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(10\,b\,(a^2-b^2)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\right)$$

# Test results for the 99 problems in "4.2.12 (e x)^m (a+b cos(c+d x^n))^p.m"

- **Problem 3: Result more than twice size of optimal antiderivative.**

$$\int x\,\mathrm{Cos}[a+b\,x^2]\,dx$$

Optimal (type 3, 15 leaves, 2 steps) :

$$\frac{\text{Sin}\left[a+b\,x^2\right]}{2\,b}$$

Result (type 3, 31 leaves) :

$$\frac{\text{Cos}\left[b\,x^2\right]\,\text{Sin}[a]}{2\,b}+\frac{\text{Cos}[a]\,\text{Sin}\left[b\,x^2\right]}{2\,b}$$

■ **Problem 90: Result unnecessarily involves imaginary or complex numbers.**

$$\int x^2\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]\,dx$$

Optimal (type 3, 346 leaves, 14 steps) :

$$\frac{240\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{b^6\,d^3}+\frac{24\,c\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{b^4\,d^3}+\frac{2\,c^2\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{b^2\,d^3}-\frac{120\,(c+d\,x)\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{b^4\,d^3}-$$
$$\frac{12\,c\,(c+d\,x)\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{b^2\,d^3}+\frac{10\,(c+d\,x)^2\,\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{b^2\,d^3}+\frac{240\,\sqrt{c+d\,x}\,\text{Sin}\left[a+b\,\sqrt{c+d\,x}\right]}{b^5\,d^3}+\frac{24\,c\,\sqrt{c+d\,x}\,\text{Sin}\left[a+b\,\sqrt{c+d\,x}\right]}{b^3\,d^3}+$$
$$\frac{2\,c^2\,\sqrt{c+d\,x}\,\text{Sin}\left[a+b\,\sqrt{c+d\,x}\right]}{b\,d^3}-\frac{40\,(c+d\,x)^{3/2}\,\text{Sin}\left[a+b\,\sqrt{c+d\,x}\right]}{b^3\,d^3}-\frac{4\,c\,(c+d\,x)^{3/2}\,\text{Sin}\left[a+b\,\sqrt{c+d\,x}\right]}{b\,d^3}+\frac{2\,(c+d\,x)^{5/2}\,\text{Sin}\left[a+b\,\sqrt{c+d\,x}\right]}{b\,d^3}$$

Result (type 3, 224 leaves) :

$$\frac{1}{b^6\,d^3}e^{-i\left(a+b\sqrt{c+d\,x}\right)}\left(120+120\,i\,b\,\sqrt{c+d\,x}+i\,b^5\,d^2\,x^2\,\sqrt{c+d\,x}-4\,i\,b^3\,\sqrt{c+d\,x}\,(2\,c+5\,d\,x)-12\,b^2\,(4\,c+5\,d\,x)+b^4\,d\,x\,(4\,c+5\,d\,x)+\right.$$
$$\left.e^{2\,i\left(a+b\sqrt{c+d\,x}\right)}\left(120-120\,i\,b\,\sqrt{c+d\,x}-i\,b^5\,d^2\,x^2\,\sqrt{c+d\,x}+4\,i\,b^3\,\sqrt{c+d\,x}\,(2\,c+5\,d\,x)-12\,b^2\,(4\,c+5\,d\,x)+b^4\,d\,x\,(4\,c+5\,d\,x)\right)\right)$$

■ **Problem 93: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}\left[a+b\,\sqrt{c+d\,x}\right]}{x}\,dx$$

Optimal (type 4, 126 leaves, 8 steps) :

$$\text{Cos}\left[a-b\,\sqrt{c}\right]\,\text{CosIntegral}\left[b\,\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]+\text{Cos}\left[a+b\,\sqrt{c}\right]\,\text{CosIntegral}\left[b\,\sqrt{c}-b\,\sqrt{c+d\,x}\right]-$$
$$\text{Sin}\left[a-b\,\sqrt{c}\right]\,\text{SinIntegral}\left[b\,\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]+\text{Sin}\left[a+b\,\sqrt{c}\right]\,\text{SinIntegral}\left[b\,\sqrt{c}-b\,\sqrt{c+d\,x}\right]$$

Result (type 4, 145 leaves) :

$$\frac{1}{2}\,e^{-i\left(a+b\sqrt{c}\right)}\left(\text{ExpIntegralEi}\left[-i\,b\,\left(-\sqrt{c}+\sqrt{c+d\,x}\right)\right]+e^{2\,i\left(a+b\sqrt{c}\right)}\,\text{ExpIntegralEi}\left[i\,b\,\left(-\sqrt{c}+\sqrt{c+d\,x}\right)\right]+\right.$$
$$\left.e^{2\,i\,b\sqrt{c}}\,\text{ExpIntegralEi}\left[-i\,b\,\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]+e^{2\,i\,a}\,\text{ExpIntegralEi}\left[i\,b\,\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]\right)$$

### Problem 94: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}\left[a+b\sqrt{c+d\,x}\right]}{x^2}\,dx$$

Optimal (type 4, 184 leaves, 10 steps):

$$-\frac{\text{Cos}\left[a+b\sqrt{c+d\,x}\right]}{x}+\frac{b\,d\,\text{CosIntegral}\left[b\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]\text{Sin}\left[a-b\sqrt{c}\right]}{2\sqrt{c}}-\frac{b\,d\,\text{CosIntegral}\left[b\sqrt{c}-b\sqrt{c+d\,x}\right]\text{Sin}\left[a+b\sqrt{c}\right]}{2\sqrt{c}}+\frac{b\,d\,\text{Cos}\left[a-b\sqrt{c}\right]\text{SinIntegral}\left[b\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]}{2\sqrt{c}}+\frac{b\,d\,\text{Cos}\left[a+b\sqrt{c}\right]\text{SinIntegral}\left[b\sqrt{c}-b\sqrt{c+d\,x}\right]}{2\sqrt{c}}$$

Result (type 4, 240 leaves):

$$\frac{1}{4\sqrt{c}\,x}\,i\left(e^{-i\,a}\left(2\,i\sqrt{c}\,e^{-i\,b\sqrt{c+d\,x}}-b\,d\,e^{-i\,b\sqrt{c}}\,x\,\text{ExpIntegralEi}\left[-i\,b\left(-\sqrt{c}+\sqrt{c+d\,x}\right)\right]+b\,d\,e^{i\,b\sqrt{c}}\,x\,\text{ExpIntegralEi}\left[-i\,b\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]\right)+e^{i\left(a-b\sqrt{c}\right)}\left(2\,i\sqrt{c}\,e^{i\,b\left(\sqrt{c}+\sqrt{c+d\,x}\right)}+b\,d\,e^{2\,i\,b\sqrt{c}}\,x\,\text{ExpIntegralEi}\left[i\,b\left(-\sqrt{c}+\sqrt{c+d\,x}\right)\right]-b\,d\,x\,\text{ExpIntegralEi}\left[i\,b\left(\sqrt{c}+\sqrt{c+d\,x}\right)\right]\right)\right)$$

### Problem 95: Result unnecessarily involves imaginary or complex numbers.

$$\int x^2\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]dx$$

Optimal (type 3, 537 leaves, 20 steps):

$$-\frac{720\,c\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^6\,d^3}-\frac{120960\,(c+d\,x)^{1/3}\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^8\,d^3}+\frac{6\,c^2\,(c+d\,x)^{1/3}\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^2\,d^3}+\frac{360\,c\,(c+d\,x)^{2/3}\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^4\,d^3}+\frac{20160\,(c+d\,x)\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^6\,d^3}-\frac{30\,c\,(c+d\,x)^{4/3}\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^2\,d^3}-\frac{1008\,(c+d\,x)^{5/3}\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^4\,d^3}+\frac{24\,(c+d\,x)^{7/3}\,\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^2\,d^3}+\frac{120960\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^9\,d^3}-\frac{6\,c^2\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^3\,d^3}-\frac{720\,c\,(c+d\,x)^{1/3}\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^5\,d^3}-\frac{60480\,(c+d\,x)^{2/3}\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^7\,d^3}+\frac{3\,c^2\,(c+d\,x)^{2/3}\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b\,d^3}+\frac{120\,c\,(c+d\,x)\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^3\,d^3}+\frac{5040\,(c+d\,x)^{4/3}\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^5\,d^3}-\frac{6\,c\,(c+d\,x)^{5/3}\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b\,d^3}-\frac{168\,(c+d\,x)^2\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b^3\,d^3}+\frac{3\,(c+d\,x)^{8/3}\,\text{Sin}\left[a+b\,(c+d\,x)^{1/3}\right]}{b\,d^3}$$

Result (type 3, 382 leaves):

$$\frac{1}{2\,b^9\,d^3}\,3\,e^{-i\,(a+b\,(c+d\,x)^{1/3})}\left(-40320\,i\left(-1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)-40320\,b\left(1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)(c+d\,x)^{1/3}+20160\,i\,b^2\left(-1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)(c+d\,x)^{2/3}-i\,b^8\,d^2\left(-1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)x^2\,(c+d\,x)^{2/3}+2\,b^7\,d\left(1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)x\,(c+d\,x)^{1/3}\,(3\,c+4\,d\,x)-240\,i\,b^4\left(-1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)(c+d\,x)^{1/3}\,(6\,c+7\,d\,x)-24\,b^5\left(1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)(c+d\,x)^{2/3}\,(9\,c+14\,d\,x)+240\,b^3\left(1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)(27\,c+28\,d\,x)+2\,i\,b^6\left(-1+e^{2\,i\,(a+b\,(c+d\,x)^{1/3})}\right)\left(9\,c^2+36\,c\,d\,x+28\,d^2\,x^2\right)\right)$$

## Problem 98: Result is not expressed in closed-form.

$$\int \frac{\mathrm{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{x}\,dx$$

Optimal (type 4, 234 leaves, 11 steps):

$$\mathrm{Cos}\left[a+b\,c^{1/3}\right]\,\mathrm{CosIntegral}\left[b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]+\mathrm{Cos}\left[a+(-1)^{2/3}\,b\,c^{1/3}\right]\,\mathrm{CosIntegral}\left[(-1)^{2/3}\,b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]+\mathrm{Cos}\left[a-(-1)^{1/3}\,b\,c^{1/3}\right]\,\mathrm{CosIntegral}\left[(-1)^{1/3}\,b\,c^{1/3}+b\,(c+d\,x)^{1/3}\right]+\mathrm{Sin}\left[a+b\,c^{1/3}\right]\,\mathrm{SinIntegral}\left[b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]+\mathrm{Sin}\left[a+(-1)^{2/3}\,b\,c^{1/3}\right]\,\mathrm{SinIntegral}\left[(-1)^{2/3}\,b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]-\mathrm{Sin}\left[a-(-1)^{1/3}\,b\,c^{1/3}\right]\,\mathrm{SinIntegral}\left[(-1)^{1/3}\,b\,c^{1/3}+b\,(c+d\,x)^{1/3}\right]$$

Result (type 7, 243 leaves):

$$\frac{1}{2}\left(\mathrm{RootSum}\left[c-\#1^3\,\&,\ \mathrm{Cos}[a+b\,\#1]\,\mathrm{CosIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]-i\,\mathrm{CosIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]\mathrm{Sin}[a+b\,\#1]-i\,\mathrm{Cos}[a+b\,\#1]\,\mathrm{SinIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]-\mathrm{Sin}[a+b\,\#1]\,\mathrm{SinIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]\,\&\right]+\mathrm{RootSum}\left[c-\#1^3\,\&,\ \mathrm{Cos}[a+b\,\#1]\,\mathrm{CosIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]+i\,\mathrm{CosIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]\mathrm{Sin}[a+b\,\#1]+i\,\mathrm{Cos}[a+b\,\#1]\,\mathrm{SinIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]-\mathrm{Sin}[a+b\,\#1]\,\mathrm{SinIntegral}\left[b\left((c+d\,x)^{1/3}-\#1\right)\right]\,\&\right]\right)$$

## Problem 99: Result is not expressed in closed-form.

$$\int \frac{\mathrm{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{x^2}\,dx$$

Optimal (type 4, 332 leaves, 13 steps):

$$-\frac{\mathrm{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{x}-\frac{b\,d\,\mathrm{CosIntegral}\left[b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]\mathrm{Sin}\left[a+b\,c^{1/3}\right]}{3\,c^{2/3}}+\frac{(-1)^{1/3}\,b\,d\,\mathrm{CosIntegral}\left[(-1)^{1/3}\,b\,c^{1/3}+b\,(c+d\,x)^{1/3}\right]\mathrm{Sin}\left[a-(-1)^{1/3}\,b\,c^{1/3}\right]}{3\,c^{2/3}}-\frac{(-1)^{2/3}\,b\,d\,\mathrm{CosIntegral}\left[(-1)^{2/3}\,b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]\mathrm{Sin}\left[a+(-1)^{2/3}\,b\,c^{1/3}\right]}{3\,c^{2/3}}+\frac{b\,d\,\mathrm{Cos}\left[a+b\,c^{1/3}\right]\mathrm{SinIntegral}\left[b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]}{3\,c^{2/3}}+\frac{(-1)^{2/3}\,b\,d\,\mathrm{Cos}\left[a+(-1)^{2/3}\,b\,c^{1/3}\right]\mathrm{SinIntegral}\left[(-1)^{2/3}\,b\,c^{1/3}-b\,(c+d\,x)^{1/3}\right]}{3\,c^{2/3}}+\frac{(-1)^{1/3}\,b\,d\,\mathrm{Cos}\left[a-(-1)^{1/3}\,b\,c^{1/3}\right]\mathrm{SinIntegral}\left[(-1)^{1/3}\,b\,c^{1/3}+b\,(c+d\,x)^{1/3}\right]}{3\,c^{2/3}}$$

Result (type 7, 138 leaves):

$$-\frac{\text{Cos}\left[a+b\,(c+d\,x)^{1/3}\right]}{x}-\frac{1}{6}\,\mathrm{i}\,b\,d\,\text{RootSum}\left[c-\#1^3\,\&,\,\frac{e^{-\mathrm{i}\,a-\mathrm{i}\,b\,\#1}\,\text{ExpIntegralEi}\left[-\mathrm{i}\,b\,\left((c+d\,x)^{1/3}-\#1\right)\right]}{\#1^2}\,\&\right]+\frac{1}{6}\,\mathrm{i}\,b\,d\,\text{RootSum}\left[c-\#1^3\,\&,\,\frac{e^{\mathrm{i}\,a+\mathrm{i}\,b\,\#1}\,\text{ExpIntegralEi}\left[\mathrm{i}\,b\,\left((c+d\,x)^{1/3}-\#1\right)\right]}{\#1^2}\,\&\right]$$

# Test results for the 88 problems in "4.2.1.2 (g sin)^p (a+b cos)^m.m"

- **Problem 58: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(e\,\text{Sin}[c+d\,x])^{11/2}}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 544 leaves, 15 steps):

$$\frac{\left(-a^2+b^2\right)^{9/4}e^{11/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{b^{11/2}\,d}+\frac{\left(-a^2+b^2\right)^{9/4}e^{11/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{b^{11/2}\,d}+\frac{2\,a\left(21\,a^4-49\,a^2\,b^2+33\,b^4\right)e^6\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{21\,b^6\,d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{a\left(a^2-b^2\right)^3e^6\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{b^6\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{a\left(a^2-b^2\right)^3e^6\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{b^6\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{2\,e^5\left(21\left(a^2-b^2\right)^2-a\,b\left(7\,a^2-12\,b^2\right)\text{Cos}[c+d\,x]\right)\sqrt{e\,\text{Sin}[c+d\,x]}}{21\,b^5\,d}+\frac{2\,e^3\left(7\left(a^2-b^2\right)-5\,a\,b\,\text{Cos}[c+d\,x]\right)(e\,\text{Sin}[c+d\,x])^{5/2}}{35\,b^3\,d}-\frac{2\,e\,(e\,\text{Sin}[c+d\,x])^{9/2}}{9\,b\,d}$$

Result (type 6, 2235 leaves):

$$\frac{1}{d}\left(\frac{a\left(28\,a^2-51\,b^2\right)\text{Cos}[c+d\,x]}{42\,b^4}+\frac{\left(-9\,a^2+14\,b^2\right)\text{Cos}[2\,(c+d\,x)]}{45\,b^3}+\frac{a\,\text{Cos}[3\,(c+d\,x)]}{14\,b^2}-\frac{\text{Cos}[4\,(c+d\,x)]}{36\,b}\right)\text{Csc}[c+d\,x]^5\,(e\,\text{Sin}[c+d\,x])^{11/2}-\frac{1}{1680\,b^4\,d\,\text{Sin}[c+d\,x]^{11/2}}$$

$$(e\,\mathrm{Sin}[c+d\,x])^{11/2}\left(\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\left(1-\mathrm{Sin}[c+d\,x]^2\right)}\,2\left(392\,a^3\,b-722\,a\,b^3\right)\mathrm{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}}\,a\left(-2\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\mathrm{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]+\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,b\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Big/\left(\left(-5\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\,2\left(-280\,a^4+636\,a^2\,b^2-721\,b^4\right)\mathrm{Cos}[c+d\,x]\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\right.$$

$$\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\left(2\,\mathrm{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\mathrm{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]-\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,a\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(-a^2+b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\left(1-2\,\mathrm{Sin}[c+d\,x]^2\right)\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\left(840\,a^4-1764\,a^2\,b^2+959\,b^4\right)\mathrm{Cos}[c+d\,x]\,\mathrm{Cos}[2\,(c+d\,x)]$$

$$\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\left(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\mathrm{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}-\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\mathrm{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}+\right.$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]-\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]+\frac{4\sqrt{\mathrm{Sin}[c+d\,x]}}{b}+$$

$$\left(10\,a\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\mathrm{AppellF1}\left[\right.\right.\right.$$

$$\left.\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(-a^2+b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)-$$

$$\left(36\,a\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\mathrm{Sin}[c+d\,x]^{5/2}\right)\Big/\left(5\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\left(9\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\mathrm{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)$$

- **Problem 59: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(e\,\mathrm{Sin}[c+d\,x])^{9/2}}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 461 leaves, 14 steps):

$$-\frac{\left(-a^2+b^2\right)^{7/4} e^{9/2} \text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{b^{9/2}\,d}+\frac{\left(-a^2+b^2\right)^{7/4} e^{9/2} \text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{b^{9/2}\,d}+$$

$$\frac{a\left(a^2-b^2\right)^2 e^5\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{b^5\left(b-\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{a\left(a^2-b^2\right)^2 e^5\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{b^5\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{2\,a\left(5\,a^2-8\,b^2\right)e^4\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{5\,b^4\,d\,\sqrt{\text{Sin}[c+d\,x]}}+\frac{2\,e^3\left(5\left(a^2-b^2\right)-3\,a\,b\,\text{Cos}[c+d\,x]\right)\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}{15\,b^3\,d}-\frac{2\,e\left(e\,\text{Sin}[c+d\,x]\right)^{7/2}}{7\,b\,d}$$

Result (type 6, 1228 leaves) :

$$-\frac{1}{5 b^3 d \operatorname{Sin}[c+d x]^{9/2}}(e \operatorname{Sin}[c+d x])^{9/2}\left(\frac{1}{(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Sin}[c+d x]^2\right)} 2\left(5 a^3-8 a b^2\right) \operatorname{Cos}[c+d x]^2\left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right)\left(\frac{1}{4 \sqrt{2}\, b^{3/2}\left(a^2-b^2\right)^{1/4}}\right.\right.$$

$$a\left(-2 \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\operatorname{Log}\left[\sqrt{a^2-b^2}-\sqrt{2} \sqrt{b}\left(a^2-b^2\right)^{1/4}\right.\right.$$

$$\left.\left.\sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]-\operatorname{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b}\left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]\right)+$$

$$\left(7 b\left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{3}{4},-\frac{1}{2}, 1, \frac{7}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right] \operatorname{Sin}[c+d x]^{3/2} \sqrt{1-\operatorname{Sin}[c+d x]^2}\right) \Big/ \left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\operatorname{AppellF1}\left[\frac{3}{4},-\frac{1}{2}, 1, \frac{7}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+2\left(2 b^2 \operatorname{AppellF1}\left[\frac{7}{4},-\frac{1}{2}, 2, \frac{11}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{7}{4}, \frac{1}{2}, 1, \frac{11}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \operatorname{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\operatorname{Sin}[c+d x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12(a+b \operatorname{Cos}[c+d x]) \sqrt{1-\operatorname{Sin}[c+d x]^2}}\left(2 a^2 b-5 b^3\right) \operatorname{Cos}[c+d x]\left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right)\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3 i)\left(2 \operatorname{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \operatorname{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\operatorname{Log}\left[\sqrt{-a^2+b^2}-(1+i) \sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+i b \operatorname{Sin}[c+d x]\right]+\operatorname{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b}\left(-a^2+b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+i b \operatorname{Sin}[c+d x]\right]\right)+$$

$$\left(56 a\left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{3}{4}, \frac{1}{2}, 1, \frac{7}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right] \operatorname{Sin}[c+d x]^{3/2}\right) \Big/ \left(\sqrt{1-\operatorname{Sin}[c+d x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\operatorname{AppellF1}\left[\frac{3}{4}, \frac{1}{2}, 1, \frac{7}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\left(2 b^2 \operatorname{AppellF1}\left[\frac{7}{4}, \frac{1}{2}, 2, \frac{11}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left.\left(-a^2+b^2\right) \operatorname{AppellF1}\left[\frac{7}{4}, \frac{3}{2}, 1, \frac{11}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \operatorname{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\operatorname{Sin}[c+d x]^2\right)\right)\right)\right)\right)+$$

$$\frac{\operatorname{Csc}[c+d x]^4 (e \operatorname{Sin}[c+d x])^{9/2}\left(-\frac{\left(-28 a^2+37 b^2\right) \operatorname{Sin}[c+d x]}{42 b^3}-\frac{a \operatorname{Sin}[2(c+d x)]}{5 b^2}+\frac{\operatorname{Sin}[3(c+d x)]}{14 b}\right)}{d}$$

- **Problem 60: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(e \,\text{Sin}[c+d x])^{7/2}}{a+b \,\text{Cos}[c+d x]} \, dx$$

Optimal (type 4, 474 leaves, 14 steps):

$$\frac{\left(-a^2+b^2\right)^{5/4} e^{7/2} \,\text{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{b^{7/2} d}+\frac{\left(-a^2+b^2\right)^{5/4} e^{7/2} \,\text{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{b^{7/2} d}-$$

$$\frac{2 a \left(3 a^2-4 b^2\right) e^4 \,\text{EllipticF}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\text{Sin}[c+d x]}}{3 b^4 d \sqrt{e \,\text{Sin}[c+d x]}}+\frac{a \left(a^2-b^2\right)^2 e^4 \,\text{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\text{Sin}[c+d x]}}{b^4 \left(a^2-b \left(b-\sqrt{-a^2+b^2}\right)\right) d \sqrt{e \,\text{Sin}[c+d x]}}+$$

$$\frac{a \left(a^2-b^2\right)^2 e^4 \,\text{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\text{Sin}[c+d x]}}{b^4 \left(a^2-b \left(b+\sqrt{-a^2+b^2}\right)\right) d \sqrt{e \,\text{Sin}[c+d x]}}+$$

$$\frac{2 e^3 \left(3 \left(a^2-b^2\right)-a b \,\text{Cos}[c+d x]\right) \sqrt{e \,\text{Sin}[c+d x]}}{3 b^3 d}-\frac{2 e \,(e \,\text{Sin}[c+d x])^{5/2}}{5 b d}$$

Result (type 6, 2155 leaves):

$$\frac{\left(-\frac{2 a \,\text{Cos}[c+d x]}{3 b^2}+\frac{\text{Cos}[2 (c+d x)]}{5 b}\right) \text{Csc}[c+d x]^3 \,(e \,\text{Sin}[c+d x])^{7/2}}{d}+$$

$$\frac{1}{60 b^2 d \,\text{Sin}[c+d x]^{7/2}} (e \,\text{Sin}[c+d x])^{7/2} \left(\frac{1}{(a+b \,\text{Cos}[c+d x]) \left(1-\text{Sin}[c+d x]^2\right)} 28 a b \,\text{Cos}[c+d x]^2 \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)\right.$$

$$\left(\frac{1}{4 \sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{3/4}} a \left(-2 \,\text{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \,\text{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \,\text{Sin}[c+d x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \,\text{Sin}[c+d x]\right]\right)+$$

$$\left(5 b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4}, -\frac{1}{2}, 1, \frac{5}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \,\text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]} \sqrt{1-\text{Sin}[c+d x]^2}\right) \Big/ \left(\left(-5 \left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4}, -\frac{1}{2}, 1, \frac{5}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2 \left(2 b^2 \,\text{AppellF1}\left[\frac{5}{4}, -\frac{1}{2}, 2, \frac{9}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\Big)\text{Sin}[c+d x]^2\Big)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\Big)\Big)+$$

$$\frac{1}{(a+b\text{Cos}[c+d x])\sqrt{1-\text{Sin}[c+d x]^2}}2\left(-10a^2+27b^2\right)\text{Cos}[c+d x]\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)\Bigg(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\Bigg(2\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}$$

$$\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\Big]-\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\right]\Bigg)+$$

$$\left(5a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d x]}\right)\Big/\Bigg(\sqrt{1-\text{Sin}[c+d x]^2}\Bigg(5\left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\Bigg(2b^2\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+$$

$$\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\Bigg)\text{Sin}[c+d x]^2\Bigg)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\Bigg)\Bigg)+$$

$$\frac{1}{(a+b\text{Cos}[c+d x])\left(1-2\text{Sin}[c+d x]^2\right)\sqrt{1-\text{Sin}[c+d x]^2}}\left(30a^2-33b^2\right)\text{Cos}[c+d x]\text{Cos}[2(c+d x)]\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)$$

$$\Bigg(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2a^2+b^2\right)\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}-\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2a^2+b^2\right)\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}+$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2a^2+b^2\right)\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\right]-$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2a^2+b^2\right)\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\right]+$$

$$\frac{4\sqrt{\text{Sin}[c+d x]}}{b}+\left(10a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d x]}\right)\Big/$$

$$\Bigg(\sqrt{1-\text{Sin}[c+d x]^2}\Bigg(5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\Bigg(2b^2\text{AppellF1}\Big[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},$$

$$\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\Bigg)\text{Sin}[c+d x]^2\Bigg)$$

$$\left.\left.\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)-\left(36\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{5/2}\right)\Big/$$

$$\left(5\sqrt{1-\text{Sin}[c+d\,x]^2}\left(9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-\right.\right.$$

$$2\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\right.$$

$$\left.\left.\left.\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)$$

- **Problem 61: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(e\,\text{Sin}[c+d\,x])^{5/2}}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 399 leaves, 13 steps):

$$-\frac{\left(-a^2+b^2\right)^{3/4}e^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{b^{5/2}\,d}+\frac{\left(-a^2+b^2\right)^{3/4}e^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{b^{5/2}\,d}-$$

$$\frac{a\left(a^2-b^2\right)e^3\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{b^3\left(b-\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{a\left(a^2-b^2\right)e^3\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{b^3\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{2\,a\,e^2\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{b^2\,d\,\sqrt{\text{Sin}[c+d\,x]}}-\frac{2\,e\,(e\,\text{Sin}[c+d\,x])^{3/2}}{3\,b\,d}$$

Result (type 6, 1151 leaves):

$$-\frac{2\,\text{Csc}[c+d\,x]\,(e\,\text{Sin}[c+d\,x])^{5/2}}{3\,b\,d}+$$

$$\frac{1}{b\,d\,\text{Sin}[c+d\,x]^{5/2}}(e\,\text{Sin}[c+d\,x])^{5/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}2\,a\,\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\left.\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}b\,\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 62: Result unnecessarily involves higher level functions.**

$$\int\frac{(e\,\text{Sin}[c+d\,x])^{3/2}}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 410 leaves, 13 steps):

$$\frac{\left(-a^2+b^2\right)^{1/4} e^{3/2} \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{b^{3/2} d}+\frac{\left(-a^2+b^2\right)^{1/4} e^{3/2} \text{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{b^{3/2} d}+$$

$$\frac{2 a e^2 \text{EllipticF}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{b^2 d \sqrt{e \text{Sin}[c+d x]}}-\frac{a \left(a^2-b^2\right) e^2 \text{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}},\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{b^2 \left(a^2-b \left(b-\sqrt{-a^2+b^2}\right)\right) d \sqrt{e \text{Sin}[c+d x]}}-$$

$$\frac{a \left(a^2-b^2\right) e^2 \text{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}},\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{b^2 \left(a^2-b \left(b+\sqrt{-a^2+b^2}\right)\right) d \sqrt{e \text{Sin}[c+d x]}}-\frac{2 e \sqrt{e \text{Sin}[c+d x]}}{b d}$$

Result (type 6, 624 leaves):

$$\frac{1}{20 d (a+b \text{Cos}[c+d x]) \text{Sin}[c+d x]^{3/2} \sqrt{1-\text{Sin}[c+d x]^2}} \text{Cos}[c+d x] (e \text{Sin}[c+d x])^{3/2} \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)$$

$$\left(-\frac{1}{b^{3/2}}(5-5 i) \left(2 \left(-a^2+b^2\right)^{1/4} \text{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \left(-a^2+b^2\right)^{1/4} \text{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\right.\right.$$

$$\left(-a^2+b^2\right)^{1/4} \text{Log}\left[\sqrt{-a^2+b^2}-(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]-$$

$$\left.\left(-a^2+b^2\right)^{1/4} \text{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]+(4+4 i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}\right)+$$

$$\left(72 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \text{Sin}[c+d x]^{5/2}\right) \Big/ \left(\sqrt{1-\text{Sin}[c+d x]^2}\right.$$

$$\left(9 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2 \left(2 b^2 \text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)$$

## Problem 63: Result unnecessarily involves higher level functions.

$$\int \frac{\sqrt{e \text{Sin}[c+d x]}}{a+b \text{Cos}[c+d x]} \, dx$$

Optimal (type 4, 302 leaves, 9 steps):

$$-\frac{\sqrt{e}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}d}+\frac{\sqrt{e}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}d}+$$

$$\frac{a\,e\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{b\left(b-\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{a\,e\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{b\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}$$

Result (type 6, 556 leaves):

$$\frac{1}{12\,d\,\sqrt{\text{Cos}[c+d\,x]^2}\,\left(a+b\,\text{Cos}[c+d\,x]\right)\sqrt{\text{Sin}[c+d\,x]}}\text{Cos}[c+d\,x]\left(a+b\sqrt{\text{Cos}[c+d\,x]^2}\right)\sqrt{e\,\text{Sin}[c+d\,x]}$$

$$\left(\frac{1}{\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}}(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-\right.\right.\right.$$

$$\left.\left.(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\,\frac{1}{2},\,1,\,\frac{7}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{\text{Cos}[c+d\,x]^2}\,\left(a^2-b^2+b^2\,\text{Sin}[c+d\,x]^2\right)\right.$$

$$\left(7\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\,\frac{1}{2},\,1,\,\frac{7}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\,\frac{1}{2},\,2,\,\frac{11}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\,\frac{3}{2},\,1,\,\frac{11}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\right)\right)$$

- **Problem 64: Result unnecessarily involves higher level functions.**

$$\int\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\sqrt{e\,\text{Sin}[c+d\,x]}}\,dx$$

Optimal (type 4, 307 leaves, 9 steps):

$$\frac{\sqrt{b}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{3/4}d\,\sqrt{e}}+\frac{\sqrt{b}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{3/4}d\,\sqrt{e}}+$$

$$\frac{a\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{a\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}$$

Result (type 6, 567 leaves):

$$\frac{1}{d\,(a+b\,\mathrm{Cos}[c+d\,x])\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\,2\,\mathrm{Cos}[c+d\,x]\,\sqrt{\mathrm{Sin}[c+d\,x]}\,\left(a+b\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)$$
$$\left(-\frac{1}{(-a^2+b^2)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\,\left(2\,\mathrm{ArcTan}\left[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\right]-2\,\mathrm{ArcTan}\left[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}\right.\right.\right.$$
$$\left.\left.(-a^2+b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]-\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i)\,\sqrt{b}\,(-a^2+b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$
$$\left(5\,a\,(a^2-b^2)\,\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right.$$
$$\left(5\,(a^2-b^2)\,\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.\right.$$
$$\left.\left.\left.\left.(-a^2+b^2)\,\mathrm{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,(-1+\mathrm{Sin}[c+d\,x]^2)\right)\right)\right)$$

- **Problem 65: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 426 leaves, 13 steps):

$$-\frac{b^{3/2}\,\mathrm{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{(-a^2+b^2)^{5/4}\,d\,e^{3/2}}+\frac{b^{3/2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{(-a^2+b^2)^{5/4}\,d\,e^{3/2}}+$$
$$\frac{2\,(b-a\,\mathrm{Cos}[c+d\,x])}{(a^2-b^2)\,d\,e\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-\frac{a\,b\,\mathrm{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)\left(b-\sqrt{-a^2+b^2}\right)d\,e\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-$$
$$\frac{a\,b\,\mathrm{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)\left(b+\sqrt{-a^2+b^2}\right)d\,e\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-\frac{2\,a\,\mathrm{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)\,d\,e^2\,\sqrt{\mathrm{Sin}[c+d\,x]}}$$

Result (type 6, 1186 leaves):

$$-\frac{2\,(-b+a\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}-$$

$$\frac{1}{(a-b)\,(a+b)\,d\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}\mathrm{Sin}[c+d\,x]^{3/2}\left(\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,\left(1-\mathrm{Sin}[c+d\,x]^2\right)}2\,a\,b\,\mathrm{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]-\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\,b\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\mathrm{Sin}[c+d\,x]^{3/2}\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12\,(a+b\,\mathrm{Cos}[c+d\,x])\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\left(a^2+b^2\right)\mathrm{Cos}[c+d\,x]\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3\,i)\left(2\,\mathrm{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\mathrm{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]+\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\mathrm{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\mathrm{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 66: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,(e\,\mathrm{Sin}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 447 leaves, 13 steps) :

$$\frac{b^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{7/4}\,d\,e^{5/2}}+\frac{b^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{7/4}\,d\,e^{5/2}}+$$

$$\frac{2\,(b-a\,\text{Cos}[c+d\,x])}{3\,\left(a^2-b^2\right)\,d\,e\,(e\,\text{Sin}[c+d\,x])^{3/2}}+\frac{2\,a\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{3\,\left(a^2-b^2\right)\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{a\,b^2\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{a\,b^2\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}$$

Result (type 6, 1192 leaves) :

$$
\begin{aligned}
&-\frac{2\,(-b+a\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{3\,(a^2-b^2)\,d\,(e\,\mathrm{Sin}[c+d\,x])^{5/2}}+\\
&\frac{1}{3\,(a-b)\,(a+b)\,d\,(e\,\mathrm{Sin}[c+d\,x])^{5/2}}\,\mathrm{Sin}[c+d\,x]^{5/2}\,\Bigg(\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,(1-\mathrm{Sin}[c+d\,x]^2)}\,2\,a\,b\,\mathrm{Cos}[c+d\,x]^2\,\Big(a+b\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\Big)\\
&\quad\Bigg(\frac{1}{4\,\sqrt{2}\,\sqrt{b}\,(a^2-b^2)^{3/4}}\,a\,\Bigg(-2\,\mathrm{ArcTan}\Big[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)^{1/4}}\Big]+2\,\mathrm{ArcTan}\Big[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)^{1/4}}\Big]-\mathrm{Log}\Big[\sqrt{a^2-b^2}-\\
&\qquad\sqrt{2}\,\sqrt{b}\,(a^2-b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\Big]+\mathrm{Log}\Big[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,(a^2-b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\Big]\Bigg)+\\
&\quad\Big(5\,b\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\,\sqrt{\mathrm{Sin}[c+d\,x]}\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\Big)\Big/\Bigg(\Bigg(-5\,(a^2-b^2)\\
&\qquad\mathrm{AppellF1}\Big[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]+2\,\Big(2\,b^2\,\mathrm{AppellF1}\Big[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]+\\
&\qquad(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\,\mathrm{Sin}[c+d\,x]^2\Bigg)\,\big(a^2+b^2\,(-1+\mathrm{Sin}[c+d\,x]^2)\big)\Bigg)\Bigg)+\\
&\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\,2\,(a^2-3\,b^2)\,\mathrm{Cos}[c+d\,x]\,\Big(a+b\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\Big)\,\Bigg(-\frac{1}{(-a^2+b^2)^{3/4}}\\
&\quad\Big(\frac{1}{8}-\frac{i}{8}\Big)\,\sqrt{b}\,\Bigg(2\,\mathrm{ArcTan}\Big[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]-2\,\mathrm{ArcTan}\Big[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]+\mathrm{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}\\
&\qquad(-a^2+b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\Big]-\mathrm{Log}\Big[\sqrt{-a^2+b^2}+(1+i)\,\sqrt{b}\,(-a^2+b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\Big]\Bigg)+\\
&\quad\Big(5\,a\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\,\sqrt{\mathrm{Sin}[c+d\,x]}\Big)\Big/\Bigg(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\,\Bigg(5\,(a^2-b^2)\\
&\qquad\mathrm{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]-2\,\Big(2\,b^2\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]+\\
&\qquad(-a^2+b^2)\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\,\mathrm{Sin}[c+d\,x]^2\Bigg)\,\big(a^2+b^2\,(-1+\mathrm{Sin}[c+d\,x]^2)\big)\Bigg)\Bigg)
\end{aligned}
$$

- **Problem 67: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,(e\,\mathrm{Sin}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 4, 501 leaves, 14 steps) :

$$-\frac{b^{7/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{9/4}\,d\,e^{7/2}}+\frac{b^{7/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{9/4}\,d\,e^{7/2}}+\frac{2\,(b-a\,\text{Cos}[c+d\,x])}{5\left(a^2-b^2\right)d\,e\,(e\,\text{Sin}[c+d\,x])^{5/2}}-$$

$$\frac{2\left(5\,b^3+a\left(3\,a^2-8\,b^2\right)\text{Cos}[c+d\,x]\right)}{5\left(a^2-b^2\right)^2 d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{a\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^2\left(b-\sqrt{-a^2+b^2}\right)d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{a\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^2\left(b+\sqrt{-a^2+b^2}\right)d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{2\,a\left(3\,a^2-8\,b^2\right)\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{5\left(a^2-b^2\right)^2 d\,e^4\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 1275 leaves) :

$$\frac{\left(-\frac{2\left(5 b^3+3 a^3 \mathrm{Cos}[c+d x]-8 a b^2 \mathrm{Cos}[c+d x]\right) \mathrm{Csc}[c+d x]}{5\left(a^2-b^2\right)^2}-\frac{2(-b+a \mathrm{Cos}[c+d x]) \mathrm{Csc}[c+d x]^3}{5\left(a^2-b^2\right)}\right) \mathrm{Sin}[c+d x]^4}{d\,(e \mathrm{Sin}[c+d x])^{7/2}}-\frac{1}{5(a-b)^2(a+b)^2 d\,(e \mathrm{Sin}[c+d x])^{7/2}}$$

$$\mathrm{Sin}[c+d x]^{7/2}\left(\frac{1}{(a+b \mathrm{Cos}[c+d x])\left(1-\mathrm{Sin}[c+d x]^2\right)} 2\left(3 a^3 b-8 a b^3\right) \mathrm{Cos}[c+d x]^2\left(a+b \sqrt{1-\mathrm{Sin}[c+d x]^2}\right)\right.$$

$$\left(\frac{1}{4 \sqrt{2}\, b^{3/2}\left(a^2-b^2\right)^{1/4}} a\left(-2 \mathrm{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\mathrm{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \mathrm{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\mathrm{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2} \sqrt{b}\left(a^2-b^2\right)^{1/4} \sqrt{\mathrm{Sin}[c+d x]}+b \mathrm{Sin}[c+d x]\right]-\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b}\left(a^2-b^2\right)^{1/4} \sqrt{\mathrm{Sin}[c+d x]}+b \mathrm{Sin}[c+d x]\right]\right)+$$

$$\left(7 b\left(a^2-b^2\right) \mathrm{AppellF1}\left[\frac{3}{4},-\frac{1}{2}, 1, \frac{7}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right] \mathrm{Sin}[c+d x]^{3/2} \sqrt{1-\mathrm{Sin}[c+d x]^2}\right) \Big/ \left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{3}{4},-\frac{1}{2}, 1, \frac{7}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right]+2\left(2 b^2 \mathrm{AppellF1}\left[\frac{7}{4},-\frac{1}{2}, 2, \frac{11}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right) \mathrm{AppellF1}\left[\frac{7}{4}, \frac{1}{2}, 1, \frac{11}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \mathrm{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12(a+b \mathrm{Cos}[c+d x]) \sqrt{1-\mathrm{Sin}[c+d x]^2}}\left(3 a^4-8 a^2 b^2-5 b^4\right) \mathrm{Cos}[c+d x]\left(a+b \sqrt{1-\mathrm{Sin}[c+d x]^2}\right)$$

$$\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}(3+3 i)\left(2 \mathrm{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\mathrm{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \mathrm{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\mathrm{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\right.\right.\right.$$

$$\left.\left.\sqrt{b}\left(-a^2+b^2\right)^{1/4} \sqrt{\mathrm{Sin}[c+d x]}+i b \mathrm{Sin}[c+d x]\right]+\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b}\left(-a^2+b^2\right)^{1/4} \sqrt{\mathrm{Sin}[c+d x]}+i b \mathrm{Sin}[c+d x]\right]\right)+$$

$$\left(56 a\left(a^2-b^2\right) \mathrm{AppellF1}\left[\frac{3}{4}, \frac{1}{2}, 1, \frac{7}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right] \mathrm{Sin}[c+d x]^{3/2}\right) \Big/ \left(\sqrt{1-\mathrm{Sin}[c+d x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{3}{4}, \frac{1}{2}, 1, \frac{7}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\left(2 b^2 \mathrm{AppellF1}\left[\frac{7}{4}, \frac{1}{2}, 2, \frac{11}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right) \mathrm{AppellF1}\left[\frac{7}{4}, \frac{3}{2}, 1, \frac{11}{4}, \mathrm{Sin}[c+d x]^2, \frac{b^2 \mathrm{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \mathrm{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d x]^2\right)\right)\right)\right)\right)$$

## Problem 68: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{(e \,\text{Sin}[c+d\,x])^{11/2}}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 557 leaves, 15 steps):

$$\frac{9\,a\,\left(-a^2+b^2\right)^{5/4} e^{11/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\,b^{11/2}\,d}+\frac{9\,a\,\left(-a^2+b^2\right)^{5/4} e^{11/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\,b^{11/2}\,d}-$$
$$\frac{3\,\left(21\,a^4-28\,a^2\,b^2+5\,b^4\right) e^6\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{7\,b^6\,d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{9\,a^2\left(a^2-b^2\right)^2 e^6\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,b^6\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right) d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{9\,a^2\left(a^2-b^2\right)^2 e^6\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,b^6\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right) d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{3\,e^5\left(21\,a\left(a^2-b^2\right)-b\left(7\,a^2-5\,b^2\right)\text{Cos}[c+d\,x]\right)\sqrt{e\,\text{Sin}[c+d\,x]}}{7\,b^5\,d}-\frac{9\,e^3\,(7\,a-5\,b\,\text{Cos}[c+d\,x])\,(e\,\text{Sin}[c+d\,x])^{5/2}}{35\,b^3\,d}+\frac{e\,(e\,\text{Sin}[c+d\,x])^{9/2}}{b\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 6, 2229 leaves):

$$\frac{\left(\frac{\left(-28\,a^2+17\,b^2\right)\text{Cos}[c+d\,x]}{14\,b^4}+\frac{\left(-a^2+b^2\right)^2}{b^5\,(a+b\,\text{Cos}[c+d\,x])}+\frac{2\,a\,\text{Cos}[2\,(c+d\,x)]}{5\,b^3}-\frac{\text{Cos}[3\,(c+d\,x)]}{14\,b^2}\right)\text{Csc}[c+d\,x]^5\,(e\,\text{Sin}[c+d\,x])^{11/2}}{d}-\frac{1}{70\,b^5\,d\,\text{Sin}[c+d\,x]^{11/2}}$$
$$(e\,\text{Sin}[c+d\,x])^{11/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}2\left(35\,a^4-126\,a^2\,b^2+75\,b^4\right)\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\frac{1}{4\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$
$$\left.\left.\left.\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$
$$\left(5\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(\left(-5\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\Big[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]+2\,\Big(2\,b^2\,\text{AppellF1}\Big[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]+$$

$$\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]\Big)\,\text{Sin}[c+d x]^2\Big)\,\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\Big)\Big)+$$

$$\frac{1}{\left(a+b\,\text{Cos}[c+d x]\right)\sqrt{1-\text{Sin}[c+d x]^2}}\,2\left(70\,a^3\,b-93\,a\,b^3\right)\text{Cos}[c+d x]\,\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)\,\Big(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\,\Big(2\,\text{ArcTan}\Big[1-\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\Big]-2\,\text{ArcTan}\Big[1+\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\Big]+\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}$$

$$\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\Big]-\text{Log}\Big[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\Big]\Big)+$$

$$\Big(5\,a\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]\sqrt{\text{Sin}[c+d x]}\Big)\Big/\Big(\sqrt{1-\text{Sin}[c+d x]^2}\,\Big(5\left(a^2-b^2\right)$$

$$\text{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]-2\,\Big(2\,b^2\,\text{AppellF1}\Big[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]+$$

$$\left(-a^2+b^2\right)\text{AppellF1}\Big[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]\Big)\,\text{Sin}[c+d x]^2\Big)\,\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\Big)\Big)+$$

$$\frac{1}{\left(a+b\,\text{Cos}[c+d x]\right)\left(1-2\,\text{Sin}[c+d x]^2\right)\sqrt{1-\text{Sin}[c+d x]^2}}\left(-140\,a^3\,b+147\,a\,b^3\right)\text{Cos}[c+d x]\,\text{Cos}[2\,(c+d x)]$$

$$\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)$$

$$\Bigg(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\text{ArcTan}\Big[1-\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\Big]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}-\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\text{ArcTan}\Big[1+\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\Big]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}+$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\Big]-$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\text{Log}\Big[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\Big]+$$

$$\frac{4\sqrt{\text{Sin}[c+d x]}}{b}+\Big(10\,a\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\Big]\sqrt{\text{Sin}[c+d x]}\Big)\Big/$$

$$\left(\sqrt{1-\text{Sin}[c+d x]^2}\left(5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\left(2 b^2\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)-\left(36 a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\text{Sin}[c+d x]^{5/2}\right)\Big/$$

$$\left(5\sqrt{1-\text{Sin}[c+d x]^2}\left(9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\left(2 b^2\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\Bigg)\Bigg)$$

- **Problem 69: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(e\,\text{Sin}[c+d x])^{9/2}}{(a+b\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 473 leaves, 14 steps) :

$$-\frac{7 a\left(-a^2+b^2\right)^{3/4}e^{9/2}\text{ArcTan}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2 b^{9/2}d}+\frac{7 a\left(-a^2+b^2\right)^{3/4}e^{9/2}\text{ArcTanh}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2 b^{9/2}d}-$$

$$\frac{7 a^2\left(a^2-b^2\right)e^5\,\text{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{2 b^5\left(b-\sqrt{-a^2+b^2}\right)d\sqrt{e\,\text{Sin}[c+d x]}}-$$

$$\frac{7 a^2\left(a^2-b^2\right)e^5\,\text{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{2 b^5\left(b+\sqrt{-a^2+b^2}\right)d\sqrt{e\,\text{Sin}[c+d x]}}+$$

$$\frac{7\left(5 a^2-3 b^2\right)e^4\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{e\,\text{Sin}[c+d x]}}{5 b^4 d\sqrt{\text{Sin}[c+d x]}}-\frac{7 e^3\left(5 a-3 b\,\text{Cos}[c+d x]\right)\left(e\,\text{Sin}[c+d x]\right)^{3/2}}{15 b^3 d}+\frac{e\left(e\,\text{Sin}[c+d x]\right)^{7/2}}{b d\left(a+b\,\text{Cos}[c+d x]\right)}$$

Result (type 6, 1229 leaves) :

$$\frac{1}{10\, b^3\, d\, \text{Sin}[c+d\,x]^{9/2}}\, 7\, (e\, \text{Sin}[c+d\,x])^{9/2} \left(\frac{1}{(a+b\, \text{Cos}[c+d\,x])\, \left(1-\text{Sin}[c+d\,x]^2\right)}\, 2\, \left(5\, a^2-3\, b^2\right)\, \text{Cos}[c+d\,x]^2 \left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right) \left(\frac{1}{4\sqrt{2}\, b^{3/2}\, \left(a^2-b^2\right)^{1/4}}\right.\right.$$

$$a\left(-2\, \text{ArcTan}\left[1-\frac{\sqrt{2}\, \sqrt{b}\, \sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\, \text{ArcTan}\left[1+\frac{\sqrt{2}\, \sqrt{b}\, \sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\, \sqrt{b}\, \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d\,x]}+\right.\right.$$

$$\left.\left. b\, \text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\, \sqrt{b}\, \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d\,x]}+b\, \text{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\, b\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right] \text{Sin}[c+d\,x]^{3/2} \sqrt{1-\text{Sin}[c+d\,x]^2}\right) \Big/ \left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\, b^2\, \text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right) \text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d\,x]^2\right) \left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{6\, (a+b\, \text{Cos}[c+d\,x])\, \sqrt{1-\text{Sin}[c+d\,x]^2}}\, a\, b\, \text{Cos}[c+d\,x] \left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right) \left(\frac{1}{\sqrt{b}\, \left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3\, i) \left(2\, \text{ArcTan}\left[1-\frac{(1+i)\, \sqrt{b}\, \sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\, \text{ArcTan}\left[1+\frac{(1+i)\, \sqrt{b}\, \sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\, \sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d\,x]}+i\, b\, \text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\, \sqrt{b}\, \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d\,x]}+i\, b\, \text{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\, a\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right] \text{Sin}[c+d\,x]^{3/2}\right) \Big/ \left(\sqrt{1-\text{Sin}[c+d\,x]^2}\, \left(7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\, b^2\, \text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left.\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\, \text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d\,x]^2\right) \left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)+$$

$$\frac{\text{Csc}[c+d\,x]^4\, (e\, \text{Sin}[c+d\,x])^{9/2} \left(-\frac{4\, a\, \text{Sin}[c+d\,x]}{3\, b^3}+\frac{-a^2\, \text{Sin}[c+d\,x]+b^2\, \text{Sin}[c+d\,x]}{b^3\, (a+b\, \text{Cos}[c+d\,x])}+\frac{\text{Sin}[2\, (c+d\,x)]}{5\, b^2}\right)}{d}$$

- **Problem 70: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(e \operatorname{Sin}[c+d x])^{7/2}}{(a+b \operatorname{Cos}[c+d x])^2} \, dx$$

Optimal (type 4, 487 leaves, 14 steps):

$$\frac{5 a \left(-a^2+b^2\right)^{1/4} e^{7/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{2 b^{7/2} d}+\frac{5 a \left(-a^2+b^2\right)^{1/4} e^{7/2} \operatorname{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{2 b^{7/2} d}+$$

$$\frac{5 \left(3 a^2-b^2\right) e^4 \operatorname{EllipticF}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{3 b^4 d \sqrt{e \operatorname{Sin}[c+d x]}}-\frac{5 a^2 \left(a^2-b^2\right) e^4 \operatorname{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{2 b^4 \left(a^2-b \left(b-\sqrt{-a^2+b^2}\right)\right) d \sqrt{e \operatorname{Sin}[c+d x]}}-$$

$$\frac{5 a^2 \left(a^2-b^2\right) e^4 \operatorname{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{2 b^4 \left(a^2-b \left(b+\sqrt{-a^2+b^2}\right)\right) d \sqrt{e \operatorname{Sin}[c+d x]}}-\frac{5 e^3 (3 a-b \operatorname{Cos}[c+d x]) \sqrt{e \operatorname{Sin}[c+d x]}}{3 b^3 d}+\frac{e (e \operatorname{Sin}[c+d x])^{5/2}}{b d (a+b \operatorname{Cos}[c+d x])}$$

Result (type 6, 2156 leaves):

$$\frac{\left(\frac{2 \operatorname{Cos}[c+d x]}{3 b^2}+\frac{-a^2+b^2}{b^3 (a+b \operatorname{Cos}[c+d x])}\right) \operatorname{Csc}[c+d x]^3 (e \operatorname{Sin}[c+d x])^{7/2}}{d}+$$

$$\frac{1}{6 b^3 d \operatorname{Sin}[c+d x]^{7/2}} (e \operatorname{Sin}[c+d x])^{7/2} \left(\frac{1}{(a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Sin}[c+d x]^2\right)} 2 \left(3 a^2-5 b^2\right) \operatorname{Cos}[c+d x]^2 \left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right)\right.$$

$$\left(\frac{1}{4 \sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{3/4}} a \left(-2 \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\operatorname{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]+\operatorname{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]\right)+$$

$$\left(5 b \left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{1}{4}, -\frac{1}{2}, 1, \frac{5}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\operatorname{Sin}[c+d x]} \sqrt{1-\operatorname{Sin}[c+d x]^2}\right) \Big/ \left(\left(-5 \left(a^2-b^2\right)\right.\right.$$

$$\operatorname{AppellF1}\left[\frac{1}{4}, -\frac{1}{2}, 1, \frac{5}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+2 \left(2 b^2 \operatorname{AppellF1}\left[\frac{5}{4}, -\frac{1}{2}, 2, \frac{9}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 1, \frac{9}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \operatorname{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\operatorname{Sin}[c+d x]^2\right)\right)\right)+$$

$$\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\,8\,a\,b\,\mathrm{Cos}[c+d\,x]\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Bigg(-\frac{1}{(-a^2+b^2)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}$$

$$\Bigg(2\,\mathrm{ArcTan}\Big[1-\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]-2\,\mathrm{ArcTan}\Big[1+\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]+\mathrm{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}$$

$$\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\Big]-\mathrm{Log}\Big[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\Big]\Bigg)+$$

$$\Big(5\,a\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\sqrt{\mathrm{Sin}[c+d\,x]}\Big)\Big/\Big(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\,\Big(5\,(a^2-b^2)$$

$$\mathrm{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]-2\,\Big(2\,b^2\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]+$$

$$(-a^2+b^2)\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\mathrm{Sin}[c+d\,x]^2\Big)\,\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\Big)\Bigg)-$$

$$\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\left(1-2\,\mathrm{Sin}[c+d\,x]^2\right)\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}\,6\,a\,b\,\mathrm{Cos}[c+d\,x]\,\mathrm{Cos}[2\,(c+d\,x)]\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)$$

$$\Bigg(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)(-2\,a^2+b^2)\,\mathrm{ArcTan}\Big[1-\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]}{b^{3/2}\,(-a^2+b^2)^{3/4}}-\frac{\left(\frac{1}{2}-\frac{i}{2}\right)(-2\,a^2+b^2)\,\mathrm{ArcTan}\Big[1+\frac{(1+i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]}{b^{3/2}\,(-a^2+b^2)^{3/4}}+$$

$$\frac{1}{b^{3/2}\,(-a^2+b^2)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)(-2\,a^2+b^2)\,\mathrm{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\Big]-$$

$$\frac{1}{b^{3/2}\,(-a^2+b^2)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)(-2\,a^2+b^2)\,\mathrm{Log}\Big[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\Big]+$$

$$\frac{4\sqrt{\mathrm{Sin}[c+d\,x]}}{b}+\Big(10\,a\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\sqrt{\mathrm{Sin}[c+d\,x]}\Big)\Big/$$

$$\Big(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\,\Big(5\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]-2\,\Big(2\,b^2\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},$$

$$\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]+(-a^2+b^2)\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\mathrm{Sin}[c+d\,x]^2\Big)$$

$$\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\Big)-\Big(36\,a\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\mathrm{Sin}[c+d\,x]^{5/2}\Big)\Big/$$

$$\left(5\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(9\,(a^2-b^2)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-\right.\right.$$
$$2\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$
$$\left.\left.\left.(-a^2+b^2)\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)$$

## Problem 71: Result unnecessarily involves higher level functions.

$$\int \frac{(e\,\text{Sin}[c+d\,x])^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 404 leaves, 13 steps):

$$-\frac{3\,a\,e^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{2\,b^{5/2}\,(-a^2+b^2)^{1/4}\,d}+\frac{3\,a\,e^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{2\,b^{5/2}\,(-a^2+b^2)^{1/4}\,d}+\frac{3\,a^2\,e^3\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,b^3\left(b-\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{3\,a^2\,e^3\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,b^3\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{3\,e^2\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{b^2\,d\,\sqrt{\text{Sin}[c+d\,x]}}+\frac{e\,(e\,\text{Sin}[c+d\,x])^{3/2}}{b\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 6, 616 leaves):

$$\frac{\text{Csc}[c+d x]\,(e\,\text{Sin}[c+d x])^{5/2}}{b\,d\,(a+b\,\text{Cos}[c+d x])}-\frac{1}{b\,d\,(a+b\,\text{Cos}[c+d x])\,\text{Sin}[c+d x]^{5/2}\left(1-\text{Sin}[c+d x]^2\right)}\,3\,\text{Cos}[c+d x]^2\,(e\,\text{Sin}[c+d x])^{5/2}\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)$$
$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\right.\right.\right.$$
$$\left.\left.\sqrt{a^2-b^2}-\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+b\,\text{Sin}[c+d x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+b\,\text{Sin}[c+d x]\right]\right)+$$
$$\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\text{Sin}[c+d x]^{3/2}\sqrt{1-\text{Sin}[c+d x]^2}\right)\Big/$$
$$\left(3\left(-7\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2\right.\right.$$
$$\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)$$
$$\left.\left.\left.\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)$$

- **Problem 72: Result unnecessarily involves higher level functions.**

$$\int\frac{(e\,\text{Sin}[c+d x])^{3/2}}{(a+b\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 418 leaves, 13 steps):

$$\frac{a\,e^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\,b^{3/2}\left(-a^2+b^2\right)^{3/4}d}+\frac{a\,e^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\,b^{3/2}\left(-a^2+b^2\right)^{3/4}d}-$$
$$\frac{e^2\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{b^2\,d\sqrt{e\,\text{Sin}[c+d x]}}+\frac{a^2\,e^2\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{2\,b^2\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\sqrt{e\,\text{Sin}[c+d x]}}+$$
$$\frac{a^2\,e^2\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{2\,b^2\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\sqrt{e\,\text{Sin}[c+d x]}}+\frac{e\sqrt{e\,\text{Sin}[c+d x]}}{b\,d\,(a+b\,\text{Cos}[c+d x])}$$

Result (type 6, 614 leaves):

$$\frac{\text{Csc}[c+d x]\,(e\,\text{Sin}[c+d x])^{3/2}}{b\,d\,(a+b\,\text{Cos}[c+d x])}-\frac{1}{b\,d\,(a+b\,\text{Cos}[c+d x])\,\text{Sin}[c+d x]^{3/2}\left(1-\text{Sin}[c+d x]^2\right)}\text{Cos}[c+d x]^2\,(e\,\text{Sin}[c+d x])^{3/2}\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)$$
$$\left(\frac{1}{4\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{3/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\right.\right.\right.$$
$$\left.\left.\sqrt{a^2-b^2}-\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+b\,\text{Sin}[c+d x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+b\,\text{Sin}[c+d x]\right]\right)+$$
$$\left(5\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d x]}\sqrt{1-\text{Sin}[c+d x]^2}\right)\Big/$$
$$\left(\left(\left(-5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.\right.\right.\right.$$
$$\left.\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)$$

- **Problem 73: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{e\,\text{Sin}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 438 leaves, 13 steps):

$$\frac{a\sqrt{e}\,\text{ArcTan}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\sqrt{b}\left(-a^2+b^2\right)^{5/4}d}-\frac{a\sqrt{e}\,\text{ArcTanh}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\sqrt{b}\left(-a^2+b^2\right)^{5/4}d}+\frac{a^2\,e\,\text{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{2\,b\left(a^2-b^2\right)\left(b-\sqrt{-a^2+b^2}\right)d\sqrt{e\,\text{Sin}[c+d x]}}+$$
$$\frac{a^2\,e\,\text{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{2\,b\left(a^2-b^2\right)\left(b+\sqrt{-a^2+b^2}\right)d\sqrt{e\,\text{Sin}[c+d x]}}+\frac{\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{e\,\text{Sin}[c+d x]}}{\left(a^2-b^2\right)d\sqrt{\text{Sin}[c+d x]}}-\frac{b\,(e\,\text{Sin}[c+d x])^{3/2}}{\left(a^2-b^2\right)d\,e\,(a+b\,\text{Cos}[c+d x])}$$

Result (type 6, 1181 leaves):

$$\frac{b\,\text{Sin}[c+d\,x]\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])}+$$

$$\frac{1}{2\,(a-b)\,(a+b)\,d\,\sqrt{\text{Sin}[c+d\,x]}}\sqrt{e\,\text{Sin}[c+d\,x]}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}2\,b\,\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{6\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}a\,\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 74: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\sqrt{e\,\text{Sin}[c+d\,x]}}\,dx$$

Optimal (type 4, 445 leaves, 13 steps):

$$-\frac{3\,a\,\sqrt{b}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\left(-a^2+b^2\right)^{7/4}d\,\sqrt{e}}-\frac{3\,a\,\sqrt{b}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{2\left(-a^2+b^2\right)^{7/4}d\,\sqrt{e}}-$$

$$\frac{\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{3\,a^2\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\left(a^2-b^2\right)\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{3\,a^2\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\left(a^2-b^2\right)\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{b\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)}$$

Result (type 6, 1182 leaves):

$$-\frac{b\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right) d\,(a+b\,\text{Cos}[c+d\,x])\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{1}{2\,(a-b)\,(a+b)\,d\,\sqrt{e\,\text{Sin}[c+d\,x]}}\sqrt{\text{Sin}[c+d\,x]}\,\left(-\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Sin}[c+d\,x]^2\right)}2\,b\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\,\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}}a\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\right.\right.\right.$$

$$\left.\left.\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,b\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Bigg/\left(\left(-5\,\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,\sqrt{1-\text{Sin}[c+d\,x]^2}}4\,a\,\text{Cos}[c+d\,x]\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\,\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\right.$$

$$\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\right.\right.$$

$$\left.\left.\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,a\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Bigg/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(5\,\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 75: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\,(e\,\text{Sin}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 507 leaves, 14 steps) :

$$\frac{5\,a\,b^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{2\,\left(-a^2+b^2\right)^{9/4}\,d\,e^{3/2}}-\frac{5\,a\,b^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{2\,\left(-a^2+b^2\right)^{9/4}\,d\,e^{3/2}}-\frac{b}{\left(a^2-b^2\right)\,d\,e\,(a+b\,\text{Cos}[c+d\,x])\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{5\,a\,b-\left(2\,a^2+3\,b^2\right)\,\text{Cos}[c+d\,x]}{\left(a^2-b^2\right)^2\,d\,e\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{5\,a^2\,b\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}}{2\,\left(a^2-b^2\right)^2\,\left(b-\sqrt{-a^2+b^2}\right)\,d\,e\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{5\,a^2\,b\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}}{2\,\left(a^2-b^2\right)^2\,\left(b+\sqrt{-a^2+b^2}\right)\,d\,e\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{\left(2\,a^2+3\,b^2\right)\,\text{EllipticE}\left[\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^2\,d\,e^2\,\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 1259 leaves) :

$$\frac{\text{Sin}[c+d\,x]^2\left(-\frac{2\left(-2\,a\,b+a^2\,\text{Cos}[c+d\,x]+b^2\,\text{Cos}[c+d\,x]\right)\text{Csc}[c+d\,x]}{\left(a^2-b^2\right)^2}+\frac{b^3\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d\,(e\,\text{Sin}[c+d\,x])^{3/2}}-\frac{1}{2\,(a-b)^2\,(a+b)^2\,d\,(e\,\text{Sin}[c+d\,x])^{3/2}}$$

$$\text{Sin}[c+d\,x]^{3/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}2\left(2\,a^2\,b+3\,b^3\right)\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}\left(2\,a^3+8\,a\,b^2\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\right.\right.\right.$$

$$\left.\left.\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 76: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\,(e\,\text{Sin}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 530 leaves, 14 steps) :

$$-\frac{7\,a\,b^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{2\,\left(-a^2+b^2\right)^{11/4}\,d\,e^{5/2}}-\frac{7\,a\,b^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{2\,\left(-a^2+b^2\right)^{11/4}\,d\,e^{5/2}}-\frac{b}{\left(a^2-b^2\right)\,d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}+$$

$$\frac{7\,a\,b-\left(2\,a^2+5\,b^2\right)\,\text{Cos}[c+d\,x]}{3\,\left(a^2-b^2\right)^2\,d\,e\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}+\frac{\left(2\,a^2+5\,b^2\right)\,\text{EllipticF}\left[\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}}{3\,\left(a^2-b^2\right)^2\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{7\,a^2\,b^2\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}}{2\,\left(a^2-b^2\right)^2\,\left(a^2-b\,\left(b-\sqrt{-a^2+b^2}\right)\right)\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{7\,a^2\,b^2\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}}{2\,\left(a^2-b^2\right)^2\,\left(a^2-b\,\left(b+\sqrt{-a^2+b^2}\right)\right)\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}$$

Result (type 6, 1257 leaves) :

$$\frac{\left(\frac{b^3}{(a^2-b^2)^2\,(a+b\,\mathrm{Cos}[c+d\,x])}-\frac{2\,(-2\,a\,b+a^2\,\mathrm{Cos}[c+d\,x]+b^2\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c+d\,x]^2}{3\,(a^2-b^2)^2}\right)\mathrm{Sin}[c+d\,x]^3}{d\,(e\,\mathrm{Sin}[c+d\,x])^{5/2}}+\frac{1}{6\,(a-b)^2\,(a+b)^2\,d\,(e\,\mathrm{Sin}[c+d\,x])^{5/2}}$$

$$\mathrm{Sin}[c+d\,x]^{5/2}\left(\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,\left(1-\mathrm{Sin}[c+d\,x]^2\right)}2\,\left(2\,a^2\,b+5\,b^3\right)\mathrm{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}}a\left(-2\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\mathrm{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]+\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,b\,\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Big/\left(\left(\left(-5\,\left(a^2-b^2\right)\right.\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}2\,\left(2\,a^3-16\,a\,b^2\right)\mathrm{Cos}[c+d\,x]\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\right.$$

$$\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\left(2\,\mathrm{ArcTan}\left[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\mathrm{ArcTan}\left[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]-\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,a\,\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\,\left(5\,\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

## Problem 77: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\,(e\,\text{Sin}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 4, 590 leaves, 15 steps):

$$\frac{9\,a\,b^{7/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{2\,(-a^2+b^2)^{13/4}\,d\,e^{7/2}} - \frac{9\,a\,b^{7/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{2\,(-a^2+b^2)^{13/4}\,d\,e^{7/2}} -$$

$$\frac{b}{(a^2-b^2)\,d\,e\,(a+b\,\text{Cos}[c+d\,x])\,(e\,\text{Sin}[c+d\,x])^{5/2}} + \frac{9\,a\,b-(2\,a^2+7\,b^2)\,\text{Cos}[c+d\,x]}{5\,(a^2-b^2)^2\,d\,e\,(e\,\text{Sin}[c+d\,x])^{5/2}} -$$

$$\frac{3\,(15\,a\,b^3+(2\,a^4-10\,a^2\,b^2-7\,b^4)\,\text{Cos}[c+d\,x])}{5\,(a^2-b^2)^3\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}} + \frac{9\,a^2\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,(a^2-b^2)^3\,\left(b-\sqrt{-a^2+b^2}\right)\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}} +$$

$$\frac{9\,a^2\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,(a^2-b^2)^3\,\left(b+\sqrt{-a^2+b^2}\right)\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}} - \frac{3\,(2\,a^4-10\,a^2\,b^2-7\,b^4)\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{5\,(a^2-b^2)^3\,d\,e^4\,\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 1344 leaves):

$$\frac{1}{d\,(e\,\text{Sin}[c+d\,x])^{7/2}}\text{Sin}[c+d\,x]^4\left(-\frac{2\left(20\,a\,b^3+3\,a^4\,\text{Cos}[c+d\,x]-15\,a^2\,b^2\,\text{Cos}[c+d\,x]-8\,b^4\,\text{Cos}[c+d\,x]\right)\text{Csc}[c+d\,x]}{5\left(a^2-b^2\right)^3}-\right.$$
$$\left.\frac{2\left(-2\,a\,b+a^2\,\text{Cos}[c+d\,x]+b^2\,\text{Cos}[c+d\,x]\right)\text{Csc}[c+d\,x]^3}{5\left(a^2-b^2\right)^2}-\frac{b^5\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)^3\,(a+b\,\text{Cos}[c+d\,x])}\right)-\frac{1}{10\,(a-b)^3\,(a+b)^3\,d\,(e\,\text{Sin}[c+d\,x])^{7/2}}$$
$$3\,\text{Sin}[c+d\,x]^{7/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}2\left(2\,a^4\,b-10\,a^2\,b^3-7\,b^5\right)\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$
$$\left.\left.\left.\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$
$$\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$
$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$
$$\left.\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$
$$\frac{1}{12\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}\left(2\,a^5-10\,a^3\,b^2-22\,a\,b^4\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$
$$\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\right.\right.\right.$$
$$\left.\left.\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$
$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$
$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$
$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 78: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(e \operatorname{Sin}[c+d x])^{13/2}}{(a+b \operatorname{Cos}[c+d x])^3} \, dx$$

Optimal (type 4, 590 leaves, 15 steps):

$$\frac{11 \left(9 a^4-11 a^2 b^2+2 b^4\right) e^{13/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 b^{13/2} \left(-a^2+b^2\right)^{1/4} d}-\frac{11 \left(9 a^4-11 a^2 b^2+2 b^4\right) e^{13/2} \operatorname{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 b^{13/2} \left(-a^2+b^2\right)^{1/4} d}-$$

$$\frac{11 a \left(9 a^4-11 a^2 b^2+2 b^4\right) e^7 \operatorname{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{8 b^7 \left(b-\sqrt{-a^2+b^2}\right) d \sqrt{e \operatorname{Sin}[c+d x]}}-$$

$$\frac{11 a \left(9 a^4-11 a^2 b^2+2 b^4\right) e^7 \operatorname{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{8 b^7 \left(b+\sqrt{-a^2+b^2}\right) d \sqrt{e \operatorname{Sin}[c+d x]}}+$$

$$\frac{11 a \left(45 a^2-37 b^2\right) e^6 \operatorname{EllipticE}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{e \operatorname{Sin}[c+d x]}}{20 b^6 d \sqrt{\operatorname{Sin}[c+d x]}}-\frac{11 e^5 \left(5 \left(9 a^2-2 b^2\right)-27 a b \operatorname{Cos}[c+d x]\right) (e \operatorname{Sin}[c+d x])^{3/2}}{60 b^5 d}+$$

$$\frac{11 e^3 (9 a+2 b \operatorname{Cos}[c+d x]) (e \operatorname{Sin}[c+d x])^{7/2}}{28 b^3 d (a+b \operatorname{Cos}[c+d x])}+\frac{e (e \operatorname{Sin}[c+d x])^{11/2}}{2 b d (a+b \operatorname{Cos}[c+d x])^2}$$

Result (type 6, 1324 leaves):

$$\frac{1}{40 b^5 d \operatorname{Sin}[c+d x]^{13/2}}$$

$$11 (e \operatorname{Sin}[c+d x])^{13/2} \left(\frac{1}{(a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Sin}[c+d x]^2\right)} 2 \left(45 a^3-37 a b^2\right) \operatorname{Cos}[c+d x]^2 \left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right) \left(\frac{1}{4 \sqrt{2} b^{3/2} \left(a^2-b^2\right)^{1/4}}\right.\right.$$

$$a \left(-2 \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\operatorname{Log}\left[\sqrt{a^2-b^2}-\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+\right.\right.$$

$$\left.\left.b \operatorname{Sin}[c+d x]\right]-\operatorname{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]\right)+$$

$$\left(7 b \left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\operatorname{Sin}[c+d x]^2,\frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right] \operatorname{Sin}[c+d x]^{3/2} \sqrt{1-\operatorname{Sin}[c+d x]^2}\right) \Big/ \left(3 \left(-7 \left(a^2-b^2\right)\right.\right.$$

$$\operatorname{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\operatorname{Sin}[c+d x]^2,\frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+2 \left(2 b^2 \operatorname{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\operatorname{Sin}[c+d x]^2,\frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\Big)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\Big)\Big)+$$

$$\frac{1}{12\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}\left(18\,a^2\,b-10\,b^3\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\Bigg(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}(3+3\,i)\Bigg(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)$$

$$\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\Big]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\Bigg)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\Bigg(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\Bigg(7\left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\Bigg(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+$$

$$\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\Bigg)\text{Sin}[c+d\,x]^2\Bigg)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{d}\text{Csc}[c+d\,x]^6\,(e\,\text{Sin}[c+d\,x])^{13/2}\left(\frac{\left(-168\,a^2+65\,b^2\right)\text{Sin}[c+d\,x]}{42\,b^5}-\frac{19\left(a^3\,\text{Sin}[c+d\,x]-a\,b^2\,\text{Sin}[c+d\,x]\right)}{4\,b^5\,(a+b\,\text{Cos}[c+d\,x])}+\right.$$

$$\frac{a^4\,\text{Sin}[c+d\,x]-2\,a^2\,b^2\,\text{Sin}[c+d\,x]+b^4\,\text{Sin}[c+d\,x]}{2\,b^5\,(a+b\,\text{Cos}[c+d\,x])^2}+$$

$$\frac{3\,a\,\text{Sin}[2\,(c+d\,x)]}{5\,b^4}-$$

$$\left.\frac{\text{Sin}[3\,(c+d\,x)]}{14\,b^3}\right)$$

- **Problem 79: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(e\,\text{Sin}[c+d\,x])^{11/2}}{(a+b\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 604 leaves, 15 steps) :

$$-\frac{9\left(7a^4-9a^2b^2+2b^4\right)e^{11/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\,b^{11/2}\left(-a^2+b^2\right)^{3/4}d}-\frac{9\left(7a^4-9a^2b^2+2b^4\right)e^{11/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\,b^{11/2}\left(-a^2+b^2\right)^{3/4}d}+\frac{3\,a\left(21a^2-13b^2\right)e^6\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{4\,b^6\,d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{9\,a\left(7a^4-9a^2b^2+2b^4\right)e^6\,\text{EllipticPi}\left[\frac{2b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\,b^6\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{9\,a\left(7a^4-9a^2b^2+2b^4\right)e^6\,\text{EllipticPi}\left[\frac{2b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\,b^6\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{3\,e^5\left(3\left(7a^2-2b^2\right)-7\,a\,b\,\text{Cos}[c+d\,x]\right)\sqrt{e\,\text{Sin}[c+d\,x]}}{4\,b^5\,d}+\frac{9\,e^3\left(7a+2\,b\,\text{Cos}[c+d\,x]\right)\left(e\,\text{Sin}[c+d\,x]\right)^{5/2}}{20\,b^3\,d\left(a+b\,\text{Cos}[c+d\,x]\right)}+\frac{e\left(e\,\text{Sin}[c+d\,x]\right)^{9/2}}{2\,b\,d\left(a+b\,\text{Cos}[c+d\,x]\right)^2}$$

Result (type 6, 2224 leaves) :

$$\frac{\left(\frac{2\,a\,\text{Cos}[c+d\,x]}{b^4}+\frac{\left(-a^2+b^2\right)^2}{2\,b^5\left(a+b\,\text{Cos}[c+d\,x]\right)^2}-\frac{17\,a\left(a^2-b^2\right)}{4\,b^5\left(a+b\,\text{Cos}[c+d\,x]\right)}-\frac{\text{Cos}[2\left(c+d\,x\right)]}{5\,b^3}\right)\text{Csc}[c+d\,x]^5\left(e\,\text{Sin}[c+d\,x]\right)^{11/2}}{d}+$$

$$\frac{1}{40\,b^5\,d\,\text{Sin}[c+d\,x]^{11/2}}\,3\left(e\,\text{Sin}[c+d\,x]\right)^{11/2}\left(\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\left(1-\text{Sin}[c+d\,x]^2\right)}\,2\left(25a^3-37\,a\,b^2\right)\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{3/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\left.\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)+$$

$$\left(5\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(\left(-5\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left(a^2-b^2\right) \text{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 1, \frac{9}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\Bigg) \text{Sin}[c+d x]^2\Bigg) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\Bigg)\Bigg) +$$

$$\frac{1}{(a+b \text{Cos}[c+d x]) \sqrt{1-\text{Sin}[c+d x]^2}} 2 \left(30 a^2 b-16 b^3\right) \text{Cos}[c+d x] \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right) \Bigg(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{8}-\frac{i}{8}\right) \sqrt{b} \Bigg(2 \text{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \text{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i) \sqrt{b}$$

$$\left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\Big]-\text{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]\Bigg)+$$

$$\left(5 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4}, \frac{1}{2}, 1, \frac{5}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]}\right) \Big/ \Bigg(\sqrt{1-\text{Sin}[c+d x]^2} \Bigg(5 \left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{4}, \frac{1}{2}, 1, \frac{5}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2 \Bigg(2 b^2 \text{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 2, \frac{9}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+$$

$$\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{5}{4}, \frac{3}{2}, 1, \frac{9}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\Bigg) \text{Sin}[c+d x]^2\Bigg) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\Bigg)\Bigg) +$$

$$\frac{1}{(a+b \text{Cos}[c+d x]) \left(1-2 \text{Sin}[c+d x]^2\right) \sqrt{1-\text{Sin}[c+d x]^2}} \left(-40 a^2 b+14 b^3\right) \text{Cos}[c+d x] \text{Cos}[2 (c+d x)]$$

$$\left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)$$

$$\Bigg(\frac{\left(\frac{1}{2}-\frac{i}{2}\right) \left(-2 a^2+b^2\right) \text{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2} \left(-a^2+b^2\right)^{3/4}}-\frac{\left(\frac{1}{2}-\frac{i}{2}\right) \left(-2 a^2+b^2\right) \text{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2} \left(-a^2+b^2\right)^{3/4}}+\frac{1}{b^{3/2} \left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{4}-\frac{i}{4}\right) \left(-2 a^2+b^2\right) \text{Log}\left[\sqrt{-a^2+b^2}-(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]-\frac{1}{b^{3/2} \left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{4}-\frac{i}{4}\right) \left(-2 a^2+b^2\right) \text{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]+\frac{4 \sqrt{\text{Sin}[c+d x]}}{b}+$$

$$\left(10 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4}, \frac{1}{2}, 1, \frac{5}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]}\right) \Big/ \Bigg(\sqrt{1-\text{Sin}[c+d x]^2} \Bigg(5 \left(a^2-b^2\right) \text{AppellF1}\Big[$$

$$\frac{1}{4}, \frac{1}{2}, 1, \frac{5}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\Big]-2 \Bigg(2 b^2 \text{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 2, \frac{9}{4}, \text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+$$

$$\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]) \text{Sin}[c+d x]^2) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)) -$$

$$(36 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \text{Sin}[c+d x]^{5/2}) \Big/ \left(5 \sqrt{1-\text{Sin}[c+d x]^2}\right. \left(9 \left(a^2-b^2\right)\right.$$

$$\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2 \left(2 b^2 \text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)$$

- **Problem 80: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(e\,\text{Sin}[c+d x])^{9/2}}{(a+b\,\text{Cos}[c+d x])^3}\,dx$$

Optimal (type 4, 498 leaves, 14 steps):

$$-\frac{7 \left(5 a^2-2 b^2\right) e^{9/2} \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 b^{9/2} \left(-a^2+b^2\right)^{1/4} d}+\frac{7 \left(5 a^2-2 b^2\right) e^{9/2} \text{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 b^{9/2} \left(-a^2+b^2\right)^{1/4} d}+$$

$$\frac{7 a \left(5 a^2-2 b^2\right) e^5 \text{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}},\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{8 b^5 \left(b-\sqrt{-a^2+b^2}\right) d \sqrt{e\,\text{Sin}[c+d x]}}+$$

$$\frac{7 a \left(5 a^2-2 b^2\right) e^5 \text{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}},\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{8 b^5 \left(b+\sqrt{-a^2+b^2}\right) d \sqrt{e\,\text{Sin}[c+d x]}}-$$

$$\frac{35 a e^4 \text{EllipticE}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{e\,\text{Sin}[c+d x]}}{4 b^4 d \sqrt{\text{Sin}[c+d x]}}+\frac{7 e^3 (5 a+2 b\,\text{Cos}[c+d x]) (e\,\text{Sin}[c+d x])^{3/2}}{12 b^3 d (a+b\,\text{Cos}[c+d x])}+\frac{e (e\,\text{Sin}[c+d x])^{7/2}}{2 b d (a+b\,\text{Cos}[c+d x])^2}$$

Result (type 6, 1231 leaves):

$$\frac{\text{Csc}[c+d x]^4 (e \text{Sin}[c+d x])^{9/2} \left(\frac{2 \text{Sin}[c+d x]}{3 b^3}+\frac{11 a \text{Sin}[c+d x]}{4 b^3 (a+b \text{Cos}[c+d x])}+\frac{-a^2 \text{Sin}[c+d x]+b^2 \text{Sin}[c+d x]}{2 b^3 (a+b \text{Cos}[c+d x])^2}\right)}{d}-$$

$$\frac{1}{8 b^3 d \text{Sin}[c+d x]^{9/2}} 7 (e \text{Sin}[c+d x])^{9/2} \left(\frac{1}{(a+b \text{Cos}[c+d x]) \left(1-\text{Sin}[c+d x]^2\right)} 10 a \text{Cos}[c+d x]^2 \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)\right.$$

$$\left(\frac{1}{4 \sqrt{2} b^{3/2} \left(a^2-b^2\right)^{1/4}} a \left(-2 \text{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \text{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]\right)+$$

$$\left(7 b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \text{Sin}[c+d x]^{3/2} \sqrt{1-\text{Sin}[c+d x]^2}\right) \Big/ \left(3 \left(-7 \left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2 \left(2 b^2 \text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right) \text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)+$$

$$\frac{1}{6 (a+b \text{Cos}[c+d x]) \sqrt{1-\text{Sin}[c+d x]^2}} b \text{Cos}[c+d x] \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right) \left(\frac{1}{\sqrt{b} \left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3 i) \left(2 \text{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \text{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i) \sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]\right)+$$

$$\left(56 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \text{Sin}[c+d x]^{3/2}\right) \Big/ \left(\sqrt{1-\text{Sin}[c+d x]^2} \left(7 \left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2 \left(2 b^2 \text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)\right)$$

- **Problem 81: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(e \text{Sin}[c+d x])^{7/2}}{(a+b \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 4, 512 leaves, 14 steps):

$$\frac{5\left(3a^2-2b^2\right)e^{7/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\,b^{7/2}\left(-a^2+b^2\right)^{3/4}d}+\frac{5\left(3a^2-2b^2\right)e^{7/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\,b^{7/2}\left(-a^2+b^2\right)^{3/4}d}-$$

$$\frac{15\,a\,e^4\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{4\,b^4\,d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{5\,a\left(3a^2-2b^2\right)e^4\,\text{EllipticPi}\left[\frac{2b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\,b^4\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{5\,a\left(3a^2-2b^2\right)e^4\,\text{EllipticPi}\left[\frac{2b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\,b^4\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{5\,e^3\,(3a+2b\,\text{Cos}[c+d\,x])\sqrt{e\,\text{Sin}[c+d\,x]}}{4\,b^3\,d\,(a+b\,\text{Cos}[c+d\,x])}+\frac{e\,(e\,\text{Sin}[c+d\,x])^{5/2}}{2\,b\,d\,(a+b\,\text{Cos}[c+d\,x])^2}$$

Result (type 6, 2154 leaves):

$$\frac{\left(\frac{-a^2+b^2}{2\,b^3\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{9\,a}{4\,b^3\,(a+b\,\text{Cos}[c+d\,x])}\right)\text{Csc}[c+d\,x]^3\,(e\,\text{Sin}[c+d\,x])^{7/2}}{d}-$$

$$\frac{1}{8\,b^3\,d\,\text{Sin}[c+d\,x]^{7/2}}(e\,\text{Sin}[c+d\,x])^{7/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}14\,a\,\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{3/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(\left(-5\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)+$$

$$\frac{1}{(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}\,12\,b\,\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\right.$$

$$\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\right.\right.$$

$$\left.\left.\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)-$$

$$\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-2\,\text{Sin}[c+d\,x]^2\right)\sqrt{1-\text{Sin}[c+d\,x]^2}}\,4\,b\,\text{Cos}[c+d\,x]\,\text{Cos}[2\,(c+d\,x)]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\left(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}-\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}+\right.$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]-$$

$$\frac{1}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+$$

$$\frac{4\sqrt{\text{Sin}[c+d\,x]}}{b}+\left(10\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$

$$\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\right.\right.\right.$$

$$\left.\left.\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)$$

$$\left.\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)-\left(36\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{5/2}\right)\Big/$$

$$\left(5\sqrt{1-\text{Sin}[c+d x]^2}\left(9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-\right.\right.$$
$$2\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$
$$\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)$$

- **Problem 82: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(e\,\text{Sin}[c+d x])^{5/2}}{(a+b\,\text{Cos}[c+d x])^3}\,dx$$

Optimal (type 4, 520 leaves, 14 steps):

$$-\frac{3\left(a^2-2b^2\right)e^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\,b^{5/2}\left(-a^2+b^2\right)^{5/4}d}+\frac{3\left(a^2-2b^2\right)e^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\,b^{5/2}\left(-a^2+b^2\right)^{5/4}d}-$$
$$\frac{3\,a\left(a^2-2b^2\right)e^3\,\text{EllipticPi}\left[\frac{2b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{8\,b^3\left(a^2-b^2\right)\left(b-\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d x]}}-$$
$$\frac{3\,a\left(a^2-2b^2\right)e^3\,\text{EllipticPi}\left[\frac{2b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{\text{Sin}[c+d x]}}{8\,b^3\left(a^2-b^2\right)\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d x]}}+$$
$$\frac{3\,a\,e^2\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right),2\right]\sqrt{e\,\text{Sin}[c+d x]}}{4\,b^2\left(a^2-b^2\right)d\,\sqrt{\text{Sin}[c+d x]}}+\frac{e\,(e\,\text{Sin}[c+d x])^{3/2}}{2\,b\,d\,(a+b\,\text{Cos}[c+d x])^2}-\frac{3\,a\,e\,(e\,\text{Sin}[c+d x])^{3/2}}{4\,b\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d x])}$$

Result (type 6, 1225 leaves):

$$\frac{\text{Csc}[c+d x]^2 (e \text{Sin}[c+d x])^{5/2} \left(\frac{\text{Sin}[c+d x]}{2 b (a+b \text{Cos}[c+d x])^2}+\frac{3 a \text{Sin}[c+d x]}{4 b \left(-a^2+b^2\right) (a+b \text{Cos}[c+d x])}\right)}{d}+$$

$$\frac{1}{8 (a-b) b (a+b) d \text{Sin}[c+d x]^{5/2}} 3 (e \text{Sin}[c+d x])^{5/2} \left(\frac{1}{(a+b \text{Cos}[c+d x]) \left(1-\text{Sin}[c+d x]^2\right)} 2 a \text{Cos}[c+d x]^2 \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)\right.$$

$$\left(\frac{1}{4 \sqrt{2} b^{3/2} \left(a^2-b^2\right)^{1/4}} a \left(-2 \text{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \text{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]\right)+$$

$$\left(7 b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \text{Sin}[c+d x]^{3/2} \sqrt{1-\text{Sin}[c+d x]^2}\right) \Big/ \left(3 \left(-7 \left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2 \left(2 b^2 \text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right) \text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)+$$

$$\frac{1}{6 (a+b \text{Cos}[c+d x]) \sqrt{1-\text{Sin}[c+d x]^2}} b \text{Cos}[c+d x] \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right) \left(\frac{1}{\sqrt{b} \left(-a^2+b^2\right)^{1/4}}\right.$$

$$(3+3 i) \left(2 \text{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \text{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i) \sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]\right)+$$

$$\left(56 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \text{Sin}[c+d x]^{3/2}\right) \Big/ \left(\sqrt{1-\text{Sin}[c+d x]^2} \left(7 \left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2 \left(2 b^2 \text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)\right)$$

- **Problem 83: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(e\,\mathrm{Sin}[c+d\,x])^{3/2}}{(a+b\,\mathrm{Cos}[c+d\,x])^{3}}\,dx$$

Optimal (type 4, 534 leaves, 14 steps):

$$-\frac{\left(a^2+2\,b^2\right)\,e^{3/2}\,\mathrm{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{8\,b^{3/2}\,\left(-a^2+b^2\right)^{7/4}\,d}-\frac{\left(a^2+2\,b^2\right)\,e^{3/2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{8\,b^{3/2}\,\left(-a^2+b^2\right)^{7/4}\,d}-$$

$$\frac{a\,e^2\,\mathrm{EllipticF}\left[\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\mathrm{Sin}[c+d\,x]}}{4\,b^2\,\left(a^2-b^2\right)\,d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}+\frac{a\,\left(a^2+2\,b^2\right)\,e^2\,\mathrm{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\mathrm{Sin}[c+d\,x]}}{8\,b^2\,\left(a^2-b^2\right)\,\left(a^2-b\,\left(b-\sqrt{-a^2+b^2}\right)\right)\,d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}+$$

$$\frac{a\,\left(a^2+2\,b^2\right)\,e^2\,\mathrm{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\mathrm{Sin}[c+d\,x]}}{8\,b^2\,\left(a^2-b^2\right)\,\left(a^2-b\,\left(b+\sqrt{-a^2+b^2}\right)\right)\,d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}+\frac{e\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{2\,b\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^2}-\frac{a\,e\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{4\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])}$$

Result (type 6, 1211 leaves):

$$\frac{\left(\frac{1}{2\,b\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{a}{4\,b\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}\right)\,\text{Csc}[c+d\,x]\,(e\,\text{Sin}[c+d\,x])^{3/2}}{d}-$$

$$\frac{1}{8\,(a-b)\,b\,(a+b)\,d\,\text{Sin}[c+d\,x]^{3/2}}\,(e\,\text{Sin}[c+d\,x])^{3/2}\,\Bigg(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Sin}[c+d\,x]^2\right)}\,2\,a\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\Bigg(\frac{1}{4\,\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}}a\,\Bigg(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\Big[\sqrt{a^2-b^2}-$$

$$\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\Big]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\Bigg)+$$

$$\left(5\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\,\sqrt{\text{Sin}[c+d\,x]}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\Bigg(\Bigg(-5\,\left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\,\Bigg(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+$$

$$\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\Bigg)\,\text{Sin}[c+d\,x]^2\Bigg)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\Bigg)\Bigg)-$$

$$\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,\sqrt{1-\text{Sin}[c+d\,x]^2}}\,4\,b\,\text{Cos}[c+d\,x]\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\,\Bigg(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\,\sqrt{b}$$

$$\Bigg(2\,\text{ArcTan}\left[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}$$

$$\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\Big]-\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\Bigg)+$$

$$\left(5\,a\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\,\sqrt{\text{Sin}[c+d\,x]}\right)\Big/\Bigg(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\Bigg(5\,\left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\,\Bigg(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+$$

$$\left(-a^2+b^2\right)\,\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\Bigg)\,\text{Sin}[c+d\,x]^2\Bigg)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\Bigg)\Bigg)\Bigg)$$

## Problem 84: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{e \operatorname{Sin}[c+d x]}}{(a+b \operatorname{Cos}[c+d x])^3} \, dx$$

Optimal (type 4, 529 leaves, 14 steps):

$$-\frac{\left(3 a^2+2 b^2\right) \sqrt{e} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 \sqrt{b} \left(-a^2+b^2\right)^{9/4} d}+\frac{\left(3 a^2+2 b^2\right) \sqrt{e} \operatorname{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 \sqrt{b} \left(-a^2+b^2\right)^{9/4} d}+$$

$$\frac{a \left(3 a^2+2 b^2\right) e \operatorname{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{8 b \left(a^2-b^2\right)^2 \left(b-\sqrt{-a^2+b^2}\right) d \sqrt{e \operatorname{Sin}[c+d x]}}+$$

$$\frac{a \left(3 a^2+2 b^2\right) e \operatorname{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}}, \frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}}{8 b \left(a^2-b^2\right)^2 \left(b+\sqrt{-a^2+b^2}\right) d \sqrt{e \operatorname{Sin}[c+d x]}}+$$

$$\frac{5 a \operatorname{EllipticE}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{e \operatorname{Sin}[c+d x]}}{4 \left(a^2-b^2\right)^2 d \sqrt{\operatorname{Sin}[c+d x]}}-\frac{b (e \operatorname{Sin}[c+d x])^{3/2}}{2 \left(a^2-b^2\right) d e (a+b \operatorname{Cos}[c+d x])^2}-\frac{5 a b (e \operatorname{Sin}[c+d x])^{3/2}}{4 \left(a^2-b^2\right)^2 d e (a+b \operatorname{Cos}[c+d x])}$$

Result (type 6, 1232 leaves):

$$\frac{\sqrt{e\,\text{Sin}[c+d\,x]}\left(-\frac{b\,\text{Sin}[c+d\,x]}{2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\frac{5\,a\,b\,\text{Sin}[c+d\,x]}{4\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+$$

$$\frac{1}{8\,(a-b)^2\,(a+b)^2\,d\,\sqrt{\text{Sin}[c+d\,x]}}\sqrt{e\,\text{Sin}[c+d\,x]}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}10\,a\,b\,\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Bigg/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}\left(8\,a^2+2\,b^2\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\left(\frac{1}{\sqrt{b}\left(-a^2+b^2\right)^{1/4}}(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\right.\right.\right.$$

$$\left.\left.\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Bigg/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 85: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^3\sqrt{e\,\text{Sin}[c+d\,x]}}\,dx$$

Optimal (type 4, 535 leaves, 14 steps) :

$$\frac{3\sqrt{b}\left(5a^2+2b^2\right)\text{ArcTan}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{11/4}d\sqrt{e}}+\frac{3\sqrt{b}\left(5a^2+2b^2\right)\text{ArcTanh}\left[\frac{\sqrt{b}\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{11/4}d\sqrt{e}}-$$

$$\frac{7\,a\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{4\left(a^2-b^2\right)^2d\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{3\,a\left(5a^2+2b^2\right)\text{EllipticPi}\left[\frac{2b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\left(a^2-b^2\right)^2\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{3\,a\left(5a^2+2b^2\right)\text{EllipticPi}\left[\frac{2b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\left(a^2-b^2\right)^2\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\sqrt{e\,\text{Sin}[c+d\,x]}}-\frac{b\sqrt{e\,\text{Sin}[c+d\,x]}}{2\left(a^2-b^2\right)d\,e\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{7\,a\,b\sqrt{e\,\text{Sin}[c+d\,x]}}{4\left(a^2-b^2\right)^2d\,e\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 6, 1226 leaves) :

$$\frac{\left(-\frac{b}{2\left(a^2-b^2\right)\left(a+b\,\mathrm{Cos}[c+d\,x]\right)^2}-\frac{7\,a\,b}{4\left(a^2-b^2\right)^2\left(a+b\,\mathrm{Cos}[c+d\,x]\right)}\right)\mathrm{Sin}[c+d\,x]}{d\sqrt{e\,\mathrm{Sin}[c+d\,x]}}+$$

$$\frac{1}{8\,(a-b)^2\,(a+b)^2\,d\sqrt{e\,\mathrm{Sin}[c+d\,x]}}\sqrt{\mathrm{Sin}[c+d\,x]}\left(-\frac{1}{\left(a+b\,\mathrm{Cos}[c+d\,x]\right)\left(1-\mathrm{Sin}[c+d\,x]^2\right)}14\,a\,b\,\mathrm{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{3/4}}a\left(-2\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\mathrm{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\sqrt{b}\right.\right.\right.$$

$$\left.\left.\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]+\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,b\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Big/\left(\left(-5\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{\left(a+b\,\mathrm{Cos}[c+d\,x]\right)\sqrt{1-\mathrm{Sin}[c+d\,x]^2}}2\left(8\,a^2+6\,b^2\right)\mathrm{Cos}[c+d\,x]\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\right.$$

$$\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\left(2\,\mathrm{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\mathrm{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\right.\right.$$

$$\left.\left.\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]-\mathrm{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+i\,b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$

$$\left(5\,a\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\right.\right.$$

$$\mathrm{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\mathrm{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(-a^2+b^2\right)\mathrm{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\mathrm{Sin}[c+d\,x]^2,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\mathrm{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\mathrm{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 86: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])^3\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 611 leaves, 15 steps):

$$-\frac{5\,b^{3/2}\left(7\,a^2+2\,b^2\right)\mathrm{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{13/4}d\,e^{3/2}}+\frac{5\,b^{3/2}\left(7\,a^2+2\,b^2\right)\mathrm{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{13/4}d\,e^{3/2}}-$$
$$\frac{b}{2\left(a^2-b^2\right)d\,e\,(a+b\,\mathrm{Cos}[c+d\,x])^2\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-\frac{9\,a\,b}{4\left(a^2-b^2\right)^2 d\,e\,(a+b\,\mathrm{Cos}[c+d\,x])\sqrt{e\,\mathrm{Sin}[c+d\,x]}}+$$
$$\frac{5\,b\left(7\,a^2+2\,b^2\right)-a\left(8\,a^2+37\,b^2\right)\mathrm{Cos}[c+d\,x]}{4\left(a^2-b^2\right)^3 d\,e\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-\frac{5\,a\,b\left(7\,a^2+2\,b^2\right)\mathrm{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\mathrm{Sin}[c+d\,x]}}{8\left(a^2-b^2\right)^3\left(b-\sqrt{-a^2+b^2}\right)d\,e\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-$$
$$\frac{5\,a\,b\left(7\,a^2+2\,b^2\right)\mathrm{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\mathrm{Sin}[c+d\,x]}}{8\left(a^2-b^2\right)^3\left(b+\sqrt{-a^2+b^2}\right)d\,e\sqrt{e\,\mathrm{Sin}[c+d\,x]}}-\frac{a\left(8\,a^2+37\,b^2\right)\mathrm{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{4\left(a^2-b^2\right)^3 d\,e^2\sqrt{\mathrm{Sin}[c+d\,x]}}$$

Result (type 6, 1316 leaves):

$$\frac{1}{d\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}\mathrm{Sin}[c+d\,x]^2$$
$$\left(-\frac{2\left(-3\,a^2\,b-b^3+a^3\,\mathrm{Cos}[c+d\,x]+3\,a\,b^2\,\mathrm{Cos}[c+d\,x]\right)\mathrm{Csc}[c+d\,x]}{\left(a^2-b^2\right)^3}+\frac{b^3\,\mathrm{Sin}[c+d\,x]}{2\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])^2}+\frac{13\,a\,b^3\,\mathrm{Sin}[c+d\,x]}{4\left(a^2-b^2\right)^3(a+b\,\mathrm{Cos}[c+d\,x])}\right)-$$
$$\frac{1}{8\,(a-b)^3\,(a+b)^3\,d\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}$$
$$\mathrm{Sin}[c+d\,x]^{3/2}\left(\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\left(1-\mathrm{Sin}[c+d\,x]^2\right)}2\left(8\,a^3\,b+37\,a\,b^3\right)\mathrm{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\mathrm{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$
$$\left.\left.\left.\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]-\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]\right)+$$
$$\left(7\,b\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{3}{4},\,-\frac{1}{2},\,1,\,\frac{7}{4},\,\mathrm{Sin}[c+d\,x]^2,\,\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\mathrm{Sin}[c+d\,x]^{3/2}\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)+$$

$$\frac{1}{12\,(a+b\,\text{Cos}[c+d x])\sqrt{1-\text{Sin}[c+d x]^2}}\left(8\,a^4+72\,a^2\,b^2+10\,b^4\right)\text{Cos}[c+d x]\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)$$

$$\left(\frac{1}{\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}}(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\,\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\right.\right.\right.$$

$$\left.\left.\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\right]\right)+$$

$$\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\text{Sin}[c+d x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d x]^2}\left(7\left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)\right)$$

- **Problem 87: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d x])^3\,(e\,\text{Sin}[c+d x])^{5/2}}\,dx$$

Optimal (type 4, 629 leaves, 15 steps) :

$$\frac{7 b^{5/2} \left(9 a^2+2 b^2\right) \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 \left(-a^2+b^2\right)^{15/4} d e^{5/2}}+\frac{7 b^{5/2} \left(9 a^2+2 b^2\right) \text{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{8 \left(-a^2+b^2\right)^{15/4} d e^{5/2}}-\frac{b}{2 \left(a^2-b^2\right) d e (a+b \text{Cos}[c+d x])^2 (e \text{Sin}[c+d x])^{3/2}}-$$

$$\frac{11 a b}{4 \left(a^2-b^2\right)^2 d e (a+b \text{Cos}[c+d x]) (e \text{Sin}[c+d x])^{3/2}}+\frac{7 b \left(9 a^2+2 b^2\right)-a \left(8 a^2+69 b^2\right) \text{Cos}[c+d x]}{12 \left(a^2-b^2\right)^3 d e (e \text{Sin}[c+d x])^{3/2}}+$$

$$\frac{a \left(8 a^2+69 b^2\right) \text{EllipticF}\left[\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{12 \left(a^2-b^2\right)^3 d e^2 \sqrt{e \text{Sin}[c+d x]}}-\frac{7 a b^2 \left(9 a^2+2 b^2\right) \text{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}},\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{8 \left(a^2-b^2\right)^3 \left(a^2-b \left(b-\sqrt{-a^2+b^2}\right)\right) d e^2 \sqrt{e \text{Sin}[c+d x]}}-$$

$$\frac{7 a b^2 \left(9 a^2+2 b^2\right) \text{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}},\frac{1}{2} \left(c-\frac{\pi}{2}+d x\right),2\right] \sqrt{\text{Sin}[c+d x]}}{8 \left(a^2-b^2\right)^3 \left(a^2-b \left(b+\sqrt{-a^2+b^2}\right)\right) d e^2 \sqrt{e \text{Sin}[c+d x]}}$$

Result (type 6, 1308 leaves) :

$$\frac{1}{d (e \text{Sin}[c+d x])^{5/2}}$$

$$\left(\frac{b^3}{2 \left(a^2-b^2\right)^2 (a+b \text{Cos}[c+d x])^2}+\frac{15 a b^3}{4 \left(a^2-b^2\right)^3 (a+b \text{Cos}[c+d x])}-\frac{2 \left(-3 a^2 b-b^3+a^3 \text{Cos}[c+d x]+3 a b^2 \text{Cos}[c+d x]\right) \text{Csc}[c+d x]^2}{3 \left(a^2-b^2\right)^3}\right)$$

$$\text{Sin}[c+d x]^3+\frac{1}{24 (a-b)^3 (a+b)^3 d (e \text{Sin}[c+d x])^{5/2}}$$

$$\text{Sin}[c+d x]^{5/2} \left(\frac{1}{(a+b \text{Cos}[c+d x]) \left(1-\text{Sin}[c+d x]^2\right)} 2 \left(8 a^3 b+69 a b^3\right) \text{Cos}[c+d x]^2 \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)\right.$$

$$\left(\frac{1}{4 \sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{3/4}} a \left(-2 \text{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \text{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\left.\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]\right)+$$

$$\left(5 b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]} \sqrt{1-\text{Sin}[c+d x]^2}\right) \Big/ \left(\left(-5 \left(a^2-b^2\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+2 \left(2 b^2 \text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\Bigg)\Bigg)+$$

$$\frac{1}{(a+b\,\text{Cos}[c+d x])\sqrt{1-\text{Sin}[c+d x]^2}}\,2\left(8a^4-120a^2b^2-42b^4\right)\text{Cos}[c+d x]\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)\Bigg(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}$$

$$\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\,\Bigg(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}$$

$$\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\Big]-\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d x]}+i\,b\,\text{Sin}[c+d x]\right]\Bigg)+$$

$$\left(5a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d x]}\right)\Bigg/\Bigg(\sqrt{1-\text{Sin}[c+d x]^2}\,\Bigg(5\left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2\Bigg(2b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]+$$

$$\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2\,\text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d x]^2\right)\right)\Bigg)\Bigg)\Bigg)$$

- **Problem 88: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d x])^3\,(e\,\text{Sin}[c+d x])^{7/2}}\,dx$$

Optimal (type 4, 700 leaves, 16 steps):

$$-\frac{9\,b^{7/2}\left(11\,a^2+2\,b^2\right)\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{17/4}d\,e^{7/2}}+\frac{9\,b^{7/2}\left(11\,a^2+2\,b^2\right)\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{17/4}d\,e^{7/2}}-$$

$$\frac{b}{2\left(a^2-b^2\right)d\,e\,(a+b\,\text{Cos}[c+d\,x])^2\,(e\,\text{Sin}[c+d\,x])^{5/2}}-\frac{13\,a\,b}{4\left(a^2-b^2\right)^2 d\,e\,(a+b\,\text{Cos}[c+d\,x])\,(e\,\text{Sin}[c+d\,x])^{5/2}}+$$

$$\frac{9\,b\left(11\,a^2+2\,b^2\right)-a\left(8\,a^2+109\,b^2\right)\text{Cos}[c+d\,x]}{20\left(a^2-b^2\right)^3 d\,e\,(e\,\text{Sin}[c+d\,x])^{5/2}}-\frac{3\left(15\,b^3\left(11\,a^2+2\,b^2\right)+a\left(8\,a^4-64\,a^2\,b^2-139\,b^4\right)\text{Cos}[c+d\,x]\right)}{20\left(a^2-b^2\right)^4 d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{9\,a\,b^3\left(11\,a^2+2\,b^2\right)\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\left(a^2-b^2\right)^4\left(b-\sqrt{-a^2+b^2}\right)d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\frac{9\,a\,b^3\left(11\,a^2+2\,b^2\right)\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{8\left(a^2-b^2\right)^4\left(b+\sqrt{-a^2+b^2}\right)d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}-$$

$$\frac{3\,a\left(8\,a^4-64\,a^2\,b^2-139\,b^4\right)\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{20\left(a^2-b^2\right)^4 d\,e^4\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 1408 leaves) :

$$\frac{1}{d\,(e\,\text{Sin}[c+d\,x])^{7/2}}\text{Sin}[c+d\,x]^4\left(-\frac{2\left(50\,a^2\,b^3+10\,b^5+3\,a^5\,\text{Cos}[c+d\,x]-24\,a^3\,b^2\,\text{Cos}[c+d\,x]-39\,a\,b^4\,\text{Cos}[c+d\,x]\right)\text{Csc}[c+d\,x]}{5\left(a^2-b^2\right)^4}-\right.$$

$$\frac{2\left(-3\,a^2\,b-b^3+a^3\,\text{Cos}[c+d\,x]+3\,a\,b^2\,\text{Cos}[c+d\,x]\right)\text{Csc}[c+d\,x]^3}{5\left(a^2-b^2\right)^3}-\frac{b^5\,\text{Sin}[c+d\,x]}{2\left(a^2-b^2\right)^3\,(a+b\,\text{Cos}[c+d\,x])^2}-$$

$$\left.\frac{21\,a\,b^5\,\text{Sin}[c+d\,x]}{4\left(a^2-b^2\right)^4\,(a+b\,\text{Cos}[c+d\,x])}\right)-\frac{1}{40\,(a-b)^4\,(a+b)^4\,d\,(e\,\text{Sin}[c+d\,x])^{7/2}}$$

$$3\,\text{Sin}[c+d\,x]^{7/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\left(1-\text{Sin}[c+d\,x]^2\right)}2\left(8\,a^5\,b-64\,a^3\,b^3-139\,a\,b^5\right)\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$

$$\left(\frac{1}{4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}}a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\right.\right.\right.$$

$$\left.\left.\left.\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)+$$

$$\left(7\, b\, (a^2-b^2)\, \text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\,(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+(a^2-b^2)\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)+$$

$$\frac{1}{12\,(a+b\,\text{Cos}[c+d\,x])\sqrt{1-\text{Sin}[c+d\,x]^2}}\left(8\,a^6-64\,a^4\,b^2-304\,a^2\,b^4-30\,b^6\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\left(\frac{1}{\sqrt{b}\,(-a^2+b^2)^{1/4}}(3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+\right.$$

$$\left.\left(56\,a\,(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\,(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+(-a^2+b^2)\,\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)$$

# Test results for the 34 problems in "4.2.13 (d+e x)^m cos(a+b x+c x^2)^n.m"

# Test results for the 22 problems in "4.2.1.3 (g tan)^p (a+b cos)^m.m"

- **Problem 1: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Tan}[x]^4}{a+a\,\text{Cos}[x]}\,dx$$

Optimal (type 3, 33 leaves, 5 steps):

$$\frac{\text{ArcTanh}[\text{Sin}[x]]}{2\,a}-\frac{\text{Sec}[x]\,\text{Tan}[x]}{2\,a}+\frac{\text{Tan}[x]^3}{3\,a}$$

Result (type 3, 105 leaves):

$$-\frac{1}{24\,a}\operatorname{Sec}[x]^3\left(9\operatorname{Cos}[x]\left(\operatorname{Log}\left[\operatorname{Cos}\left[\frac{x}{2}\right]-\operatorname{Sin}\left[\frac{x}{2}\right]\right]-\operatorname{Log}\left[\operatorname{Cos}\left[\frac{x}{2}\right]+\operatorname{Sin}\left[\frac{x}{2}\right]\right]\right)+\right.$$
$$\left.3\operatorname{Cos}[3\,x]\left(\operatorname{Log}\left[\operatorname{Cos}\left[\frac{x}{2}\right]-\operatorname{Sin}\left[\frac{x}{2}\right]\right]-\operatorname{Log}\left[\operatorname{Cos}\left[\frac{x}{2}\right]+\operatorname{Sin}\left[\frac{x}{2}\right]\right]\right)+2\,(-3\operatorname{Sin}[x]+3\operatorname{Sin}[2\,x]+\operatorname{Sin}[3\,x])\right)$$

- **Problem 3: Result more than twice size of optimal antiderivative.**

$$\int\frac{\operatorname{Tan}[x]^2}{a+a\operatorname{Cos}[x]}\,dx$$

Optimal (type 3, 15 leaves, 4 steps) :

$$-\frac{\operatorname{ArcTanh}[\operatorname{Sin}[x]]}{a}+\frac{\operatorname{Tan}[x]}{a}$$

Result (type 3, 39 leaves) :

$$\frac{\operatorname{Log}\left[\operatorname{Cos}\left[\frac{x}{2}\right]-\operatorname{Sin}\left[\frac{x}{2}\right]\right]-\operatorname{Log}\left[\operatorname{Cos}\left[\frac{x}{2}\right]+\operatorname{Sin}\left[\frac{x}{2}\right]\right]+\operatorname{Tan}[x]}{a}$$

- **Problem 19: Result more than twice size of optimal antiderivative.**

$$\int\sqrt{a+b\operatorname{Cos}[x]}\,\operatorname{Tan}[x]\,dx$$

Optimal (type 3, 37 leaves, 4 steps) :

$$2\sqrt{a}\,\operatorname{ArcTanh}\left[\frac{\sqrt{a+b\operatorname{Cos}[x]}}{\sqrt{a}}\right]-2\sqrt{a+b\operatorname{Cos}[x]}$$

Result (type 3, 75 leaves) :

$$-\frac{2\sqrt{a+b\operatorname{Cos}[x]}\left(b+a\operatorname{Sec}[x]-\sqrt{a}\,\sqrt{b}\,\operatorname{ArcSinh}\left[\frac{\sqrt{a}\,\sqrt{\operatorname{Sec}[x]}}{\sqrt{b}}\right]\sqrt{\operatorname{Sec}[x]}\,\sqrt{1+\frac{a\operatorname{Sec}[x]}{b}}\right)}{b+a\operatorname{Sec}[x]}$$

- **Problem 20: Result more than twice size of optimal antiderivative.**

$$\int\frac{\operatorname{Tan}[x]}{\sqrt{a+b\operatorname{Cos}[x]}}\,dx$$

Optimal (type 3, 24 leaves, 3 steps) :

$$\frac{2\operatorname{ArcTanh}\left[\frac{\sqrt{a+b\operatorname{Cos}[x]}}{\sqrt{a}}\right]}{\sqrt{a}}$$

Result (type 3, 60 leaves) :

$$\frac{2\sqrt{b}\,\text{ArcSinh}\left[\frac{\sqrt{a}\,\sqrt{\text{Sec}[x]}}{\sqrt{b}}\right]\sqrt{\frac{b+a\,\text{Sec}[x]}{b}}}{\sqrt{a}\,\sqrt{a+b\,\text{Cos}[x]}\,\sqrt{\text{Sec}[x]}}$$

- **Problem 21: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{e\,\text{Tan}[c+d\,x]}}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 204 leaves, 9 steps):

$$-\frac{2\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[-\frac{\sqrt{-a+b}}{\sqrt{a+b}},\,\text{ArcSin}\left[\frac{\sqrt{\text{Sin}[c+d\,x]}}{\sqrt{1+\text{Cos}[c+d\,x]}}\right],\,-1\right]\sqrt{e\,\text{Tan}[c+d\,x]}}{\sqrt{-a+b}\,\sqrt{a+b}\,d\,\sqrt{\text{Sin}[c+d\,x]}}+$$
$$\frac{2\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{\sqrt{-a+b}}{\sqrt{a+b}},\,\text{ArcSin}\left[\frac{\sqrt{\text{Sin}[c+d\,x]}}{\sqrt{1+\text{Cos}[c+d\,x]}}\right],\,-1\right]\sqrt{e\,\text{Tan}[c+d\,x]}}{\sqrt{-a+b}\,\sqrt{a+b}\,d\,\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 584 leaves):

$$\frac{1}{d\,(a+b\,\text{Cos}[c+d\,x])\,\sqrt{\text{Tan}[c+d\,x]}\,\left(1+\text{Tan}[c+d\,x]^2\right)^{3/2}}\,2\,\text{Sec}[c+d\,x]^2\,\sqrt{e\,\text{Tan}[c+d\,x]}\,\left(b+a\sqrt{1+\text{Tan}[c+d\,x]^2}\right)$$
$$\left(\frac{1}{4\sqrt{2}\,\sqrt{a}\,\left(a^2-b^2\right)^{1/4}}\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{a}\,\sqrt{\text{Tan}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{a}\,\sqrt{\text{Tan}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\right.\right.$$
$$\left.\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{a}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Tan}[c+d\,x]}+a\,\text{Tan}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{a}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Tan}[c+d\,x]}+a\,\text{Tan}[c+d\,x]\right]\right)+$$
$$\left(7\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},\,\frac{1}{2},\,1,\,\frac{7}{4},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Tan}[c+d\,x]^{3/2}\right)\Big/$$
$$\left(3\sqrt{1+\text{Tan}[c+d\,x]^2}\,\left(-7\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},\,\frac{1}{2},\,1,\,\frac{7}{4},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$2\left(2\,a^2\,\text{AppellF1}\left[\frac{7}{4},\,\frac{1}{2},\,2,\,\frac{11}{4},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\right.$$
$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{7}{4},\,\frac{3}{2},\,1,\,\frac{11}{4},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)\right)$$

# Test results for the 932 problems in "4.2.2.1 (a+b cos)^m (c+d cos)^n.m"

## Problem 7: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x] \, dx$$

Optimal (type 3, 16 leaves, 2 steps):

$$a x + \frac{a \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{d}$$

Result (type 3, 73 leaves):

$$a x - \frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d}$$

## Problem 8: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^2 \, dx$$

Optimal (type 3, 24 leaves, 4 steps):

$$\frac{a \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{d} + \frac{a \operatorname{Tan}[c + d x]}{d}$$

Result (type 3, 81 leaves):

$$-\frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a \operatorname{Tan}[c + d x]}{d}$$

## Problem 9: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^3 \, dx$$

Optimal (type 3, 47 leaves, 5 steps):

$$\frac{a \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{a \operatorname{Tan}[c + d x]}{d} + \frac{a \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d}$$

Result (type 3, 138 leaves):

$$-\frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{a}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{a}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{a \operatorname{Tan}[c + d x]}{d}$$

## Problem 10: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^4 \, dx$$

Optimal (type 3, 63 leaves, 5 steps):

$$\frac{a \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{a \operatorname{Tan}[c + d x]}{d} + \frac{a \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d} + \frac{a \operatorname{Tan}[c + d x]^3}{3 d}$$

Result (type 3, 163 leaves):

$$-\frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{a}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{a}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{2 a \operatorname{Tan}[c + d x]}{3 d} + \frac{a \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{3 d}$$

## Problem 11: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^5 \, dx$$

Optimal (type 3, 85 leaves, 6 steps):

$$\frac{3 a \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{8 d} + \frac{a \operatorname{Tan}[c + d x]}{d} + \frac{3 a \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{8 d} + \frac{a \operatorname{Sec}[c + d x]^3 \operatorname{Tan}[c + d x]}{4 d} + \frac{a \operatorname{Tan}[c + d x]^3}{3 d}$$

Result (type 3, 227 leaves):

$$-\frac{3 a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{8 d} + \frac{3 a \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{8 d} + \frac{a}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} + \frac{3 a}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{a}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} - \frac{3 a}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{2 a \operatorname{Tan}[c + d x]}{3 d} + \frac{a \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{3 d}$$

## Problem 12: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^6 \, dx$$

Optimal (type 3, 101 leaves, 6 steps):

$$\frac{3 a \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{8 d} + \frac{a \operatorname{Tan}[c + d x]}{d} + \frac{3 a \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{8 d} + \frac{a \operatorname{Sec}[c + d x]^3 \operatorname{Tan}[c + d x]}{4 d} + \frac{2 a \operatorname{Tan}[c + d x]^3}{3 d} + \frac{a \operatorname{Tan}[c + d x]^5}{5 d}$$

Result (type 3, 249 leaves):

$$-\frac{3\,a\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{3\,a\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{a}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{3\,a}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{a}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}-$$
$$\frac{3\,a}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{8\,a\,\text{Tan}[c+d\,x]}{15\,d}+\frac{4\,a\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{15\,d}+\frac{a\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

- **Problem 18: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 34 leaves, 3 steps):

$$2\,a^2\,x+\frac{a^2\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{a^2\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 106 leaves):

$$2\,a^2\,x-\frac{a^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a^2\,\text{Cos}[d\,x]\,\text{Sin}[c]}{d}+\frac{a^2\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}$$

- **Problem 20: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 54 leaves, 7 steps):

$$\frac{3\,a^2\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{2\,a^2\,\text{Tan}[c+d\,x]}{d}+\frac{a^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 119 leaves):

$$\frac{1}{4\,d}a^2\left(-6\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+6\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$\left.\frac{1}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{1}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+8\,\text{Tan}[c+d\,x]\right)$$

- **Problem 21: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 66 leaves, 8 steps):

$$\frac{a^2 \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{d}+\frac{2 a^2 \operatorname{Tan}[c+d x]}{d}+\frac{a^2 \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{d}+\frac{a^2 \operatorname{Tan}[c+d x]^3}{3 d}$$

Result (type 3, 669 leaves):

$$-\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{4 d}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{4 d}+$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{24 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(7 \operatorname{Cos}\left[\frac{c}{2}\right]-5 \operatorname{Sin}\left[\frac{c}{2}\right]\right)}{48 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$
$$\frac{5(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{24 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-7 \operatorname{Cos}\left[\frac{c}{2}\right]-5 \operatorname{Sin}\left[\frac{c}{2}\right]\right)}{48 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{5(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 22: Result more than twice size of optimal antiderivative.**

$$\int(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 96 leaves, 9 steps):

$$\frac{7 a^2 \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{8 d}+\frac{2 a^2 \operatorname{Tan}[c+d x]}{d}+\frac{7 a^2 \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{8 d}+\frac{a^2 \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{4 d}+\frac{2 a^2 \operatorname{Tan}[c+d x]^3}{3 d}$$

Result (type 3, 797 leaves):

$$-\frac{7(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{32 d}+\frac{7(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{32 d}+$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{64 d\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(29 \operatorname{Cos}\left[\frac{c}{2}\right]-13 \operatorname{Sin}\left[\frac{c}{2}\right]\right)}{192 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{3 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}-$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{64 d\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-29 \operatorname{Cos}\left[\frac{c}{2}\right]-13 \operatorname{Sin}\left[\frac{c}{2}\right]\right)}{192 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{(a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{3 d\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 28: Result more than twice size of optimal antiderivative.**

$$\int (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^2 \, dx$$

Optimal (type 3, 48 leaves, 6 steps):

$$3 a^3 x + \frac{3 a^3 \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{d} + \frac{a^3 \operatorname{Sin}[c + d x]}{d} + \frac{a^3 \operatorname{Tan}[c + d x]}{d}$$

Result (type 3, 211 leaves):

$$\frac{1}{8} a^3 (1 + \operatorname{Cos}[c + d x])^3 \operatorname{Sec}\left[\frac{1}{2} (c + d x)\right]^6 \left(3 x - \frac{3 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{d} + \frac{3 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{d} + \frac{\operatorname{Cos}[d x] \operatorname{Sin}[c]}{d} + \frac{\operatorname{Cos}[c] \operatorname{Sin}[d x]}{d} + \frac{\operatorname{Sin}\left[\frac{d x}{2}\right]}{d \left(\operatorname{Cos}\left[\frac{c}{2}\right] - \operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)} + \frac{\operatorname{Sin}\left[\frac{d x}{2}\right]}{d \left(\operatorname{Cos}\left[\frac{c}{2}\right] + \operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)}\right)$$

- **Problem 29: Result more than twice size of optimal antiderivative.**

$$\int (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^3 \, dx$$

Optimal (type 3, 59 leaves, 7 steps):

$$a^3 x + \frac{7 a^3 \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{3 a^3 \operatorname{Tan}[c + d x]}{d} + \frac{a^3 \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d}$$

Result (type 3, 144 leaves):

$$a^3 \left(\frac{c}{d} + x - \frac{7 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{7 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{1}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{1}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{3 \operatorname{Tan}[c + d x]}{d}\right)$$

- **Problem 30: Result more than twice size of optimal antiderivative.**

$$\int (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^4 \, dx$$

Optimal (type 3, 72 leaves, 9 steps):

$$\frac{5 a^3 \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{4 a^3 \operatorname{Tan}[c + d x]}{d} + \frac{3 a^3 \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d} + \frac{a^3 \operatorname{Tan}[c + d x]^3}{3 d}$$

Result (type 3, 669 leaves):

$$-\frac{5\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{16\,d}+\frac{5\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{16\,d}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{48\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(5\,\mathrm{Cos}\left[\frac{c}{2}\right]-4\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{48\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{11\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{48\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(-5\,\mathrm{Cos}\left[\frac{c}{2}\right]-4\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{48\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+\frac{11\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

## Problem 31: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 93 leaves, 11 steps):

$$\frac{15\,a^3\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{4\,a^3\,\mathrm{Tan}[c+d\,x]}{d}+\frac{15\,a^3\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{8\,d}+\frac{a^3\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{a^3\,\mathrm{Tan}[c+d\,x]^3}{d}$$

Result (type 3, 797 leaves):

$$-\frac{15\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{64\,d}+\frac{15\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{64\,d}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{128\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(19\,\mathrm{Cos}\left[\frac{c}{2}\right]-11\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{128\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+\frac{3\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{128\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(-19\,\mathrm{Cos}\left[\frac{c}{2}\right]-11\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{128\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+\frac{3\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

## Problem 32: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 114 leaves, 11 steps):

$$\frac{13 a^3 \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{4 a^3 \text{Tan}[c+d x]}{d}+\frac{13 a^3 \text{Sec}[c+d x] \text{Tan}[c+d x]}{8 d}+\frac{3 a^3 \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{4 d}+\frac{5 a^3 \text{Tan}[c+d x]^3}{3 d}+\frac{a^3 \text{Tan}[c+d x]^5}{5 d}$$

Result (type 3, 487 leaves):

$$-\frac{1}{3840 d} a^3 \text{Sec}[c] \text{Sec}[c+d x]^5 \left(975 \text{Cos}[2 c+3 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+975 \text{Cos}[4 c+3 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\right.$$
$$195 \text{Cos}[4 c+5 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+195 \text{Cos}[6 c+5 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+$$
$$1950 \text{Cos}[d x] \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)+$$
$$1950 \text{Cos}[2 c+d x] \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)-$$
$$975 \text{Cos}[2 c+3 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-975 \text{Cos}[4 c+3 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-$$
$$195 \text{Cos}[4 c+5 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-195 \text{Cos}[6 c+5 d x] \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-$$
$$4640 \text{Sin}[d x]+1440 \text{Sin}[2 c+d x]-1500 \text{Sin}[c+2 d x]-1500 \text{Sin}[3 c+2 d x]-$$
$$\left.3040 \text{Sin}[2 c+3 d x]-390 \text{Sin}[3 c+4 d x]-390 \text{Sin}[5 c+4 d x]-608 \text{Sin}[4 c+5 d x]\right)$$

- **Problem 37: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^4 \text{Sec}[c+d x]^2 \, dx$$

Optimal (type 3, 73 leaves, 8 steps):

$$\frac{13 a^4 x}{2}+\frac{4 a^4 \text{ArcTanh}[\text{Sin}[c+d x]]}{d}+\frac{4 a^4 \text{Sin}[c+d x]}{d}+\frac{a^4 \text{Cos}[c+d x] \text{Sin}[c+d x]}{2 d}+\frac{a^4 \text{Tan}[c+d x]}{d}$$

Result (type 3, 241 leaves):

$$\frac{1}{64} a^4 (1+\text{Cos}[c+d x])^4 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^8 \left(26 x - \frac{16 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d} + \frac{16 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d} + \frac{16 \text{Cos}[d x] \text{Sin}[c]}{d} + \frac{\text{Cos}[2 d x] \text{Sin}[2 c]}{d} + \frac{16 \text{Cos}[c] \text{Sin}[d x]}{d} + \frac{\text{Cos}[2 c] \text{Sin}[2 d x]}{d} + \frac{4 \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)} + \frac{4 \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}\right)$$

- **Problem 38: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^4 \text{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 73 leaves, 8 steps):

$$4 a^4 x + \frac{13 a^4 \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d} + \frac{a^4 \text{Sin}[c+d x]}{d} + \frac{4 a^4 \text{Tan}[c+d x]}{d} + \frac{a^4 \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 d}$$

Result (type 3, 272 leaves):

$$\frac{1}{64} a^4 (1+\text{Cos}[c+d x])^4 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^8 \left(16 x - \frac{26 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d} + \frac{26 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d} + \frac{4 \text{Cos}[d x] \text{Sin}[c]}{d} + \frac{4 \text{Cos}[c] \text{Sin}[d x]}{d} + \frac{1}{d \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2} + \frac{16 \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)} - \frac{1}{d \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2} + \frac{16 \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}\right)$$

- **Problem 39: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^4 \text{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 73 leaves, 9 steps):

$$a^4 x + \frac{6 a^4 \text{ArcTanh}[\text{Sin}[c+d x]]}{d} + \frac{7 a^4 \text{Tan}[c+d x]}{d} + \frac{2 a^4 \text{Sec}[c+d x] \text{Tan}[c+d x]}{d} + \frac{a^4 \text{Tan}[c+d x]^3}{3 d}$$

Result (type 3, 178 leaves):

$$\frac{1}{12\,d}a^4\,\mathrm{Sec}[c+d\,x]^3\left(9\,\mathrm{Cos}[c+d\,x]\left(c+d\,x-6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+\right.$$
$$3\,\mathrm{Cos}[3\,(c+d\,x)]\left(c+d\,x-6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+$$
$$\left.4\,(6\,\mathrm{Sin}[c+d\,x]+3\,\mathrm{Sin}[2\,(c+d\,x)]+5\,\mathrm{Sin}[3\,(c+d\,x)])\right)$$

- **Problem 40: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 96 leaves, 12 steps):

$$\frac{35\,a^4\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{8\,a^4\,\mathrm{Tan}[c+d\,x]}{d}+\frac{27\,a^4\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{8\,d}+\frac{a^4\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{4\,a^4\,\mathrm{Tan}[c+d\,x]^3}{3\,d}$$

Result (type 3, 797 leaves):

$$-\frac{35\,(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{128\,d}+\frac{35\,(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{128\,d}+$$
$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{256\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$
$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\left(97\,\mathrm{Cos}\left[\frac{c}{2}\right]-65\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{768\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+\frac{5\,(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{12\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$
$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{256\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$
$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\left(-97\,\mathrm{Cos}\left[\frac{c}{2}\right]-65\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{768\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+\frac{5\,(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{12\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 41: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^4\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 111 leaves, 13 steps):

$$\frac{7\,a^4\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,d}+\frac{8\,a^4\,\mathrm{Tan}[c+d\,x]}{d}+\frac{7\,a^4\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}+\frac{a^4\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{d}+\frac{8\,a^4\,\mathrm{Tan}[c+d\,x]^3}{3\,d}+\frac{a^4\,\mathrm{Tan}[c+d\,x]^5}{5\,d}$$

Result (type 3, 498 leaves):

$$-\frac{1}{960\,d}a^4\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^5$$
$$\left(525\,\mathrm{Cos}[2\,c+3\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+525\,\mathrm{Cos}[4\,c+3\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\right.$$
$$105\,\mathrm{Cos}[4\,c+5\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+105\,\mathrm{Cos}[6\,c+5\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+$$
$$1050\,\mathrm{Cos}[d\,x]\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+$$
$$1050\,\mathrm{Cos}[2\,c+d\,x]\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)-$$
$$525\,\mathrm{Cos}[2\,c+3\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-525\,\mathrm{Cos}[4\,c+3\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-$$
$$105\,\mathrm{Cos}[4\,c+5\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-105\,\mathrm{Cos}[6\,c+5\,d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-$$
$$2360\,\mathrm{Sin}[d\,x]+960\,\mathrm{Sin}[2\,c+d\,x]-660\,\mathrm{Sin}[c+2\,d\,x]-660\,\mathrm{Sin}[3\,c+2\,d\,x]-1600\,\mathrm{Sin}[2\,c+3\,d\,x]+$$
$$\left.60\,\mathrm{Sin}[4\,c+3\,d\,x]-210\,\mathrm{Sin}[3\,c+4\,d\,x]-210\,\mathrm{Sin}[5\,c+4\,d\,x]-332\,\mathrm{Sin}[4\,c+5\,d\,x]\right)$$

- **Problem 46: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^2}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 43 leaves, 4 steps):

$$-\frac{x}{a}+\frac{\mathrm{Sin}[c+d\,x]}{a\,d}+\frac{\mathrm{Sin}[c+d\,x]}{a\,d\,(1+\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 89 leaves):

$$\frac{1}{4\,a\,d}\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(-2\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-2\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 49: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Sec}[c+d\,x]}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 38 leaves, 3 steps):

$$\frac{\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a\,d}-\frac{\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 103 leaves):

$$-\frac{1}{a\,d\,(1+\mathrm{Cos}[c+d\,x])}2\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)$$

- **Problem 50: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Sec}[c+d\,x]^2}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 53 leaves, 5 steps):

$$-\frac{\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a\,d}+\frac{2\,\mathrm{Tan}[c+d\,x]}{a\,d}-\frac{\mathrm{Tan}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 188 leaves):

$$\frac{1}{a\,d\,(1+\mathrm{Cos}[c+d\,x])}2\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\mathrm{Sin}[d\,x]\Big/\left(\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)$$

- **Problem 51: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Sec}[c+d\,x]^3}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 83 leaves, 6 steps):

$$\frac{3\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a\,d}-\frac{2\,\mathrm{Tan}[c+d\,x]}{a\,d}+\frac{3\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}-\frac{\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 244 leaves):

$$\frac{1}{2\,a\,d\,(1+\mathrm{Cos}[c+d\,x])}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(-4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(-6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{1}{\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{1}{\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-(4\,\mathrm{Sin}[d\,x])\Big/\left(\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)$$

## Problem 52: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[c+d x]^4}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 103 leaves, 6 steps):

$$-\frac{3 \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a d}+\frac{4 \text{Tan}[c+d x]}{a d}-\frac{3 \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a d}-\frac{\text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{d (a+a \text{Cos}[c+d x])}+\frac{4 \text{Tan}[c+d x]^3}{3 a d}$$

Result (type 3, 706 leaves):

$$\frac{3 \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d (a+a \text{Cos}[c+d x])}-\frac{3 \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d (a+a \text{Cos}[c+d x])}+$$

$$\frac{2 \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]}{d (a+a \text{Cos}[c+d x])}+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sin}\left[\frac{d x}{2}\right]}{3 d (a+a \text{Cos}[c+d x]) \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(-\text{Cos}\left[\frac{c}{2}\right]+2 \text{Sin}\left[\frac{c}{2}\right]\right)}{3 d (a+a \text{Cos}[c+d x]) \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{10 \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sin}\left[\frac{d x}{2}\right]}{3 d (a+a \text{Cos}[c+d x]) \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sin}\left[\frac{d x}{2}\right]}{3 d (a+a \text{Cos}[c+d x]) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(\text{Cos}\left[\frac{c}{2}\right]+2 \text{Sin}\left[\frac{c}{2}\right]\right)}{3 d (a+a \text{Cos}[c+d x]) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{10 \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sin}\left[\frac{d x}{2}\right]}{3 d (a+a \text{Cos}[c+d x]) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

## Problem 59: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[c+d x]}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 66 leaves, 4 steps):

$$\frac{\text{ArcTanh}[\text{Sin}[c+d x]]}{a^2 d}-\frac{4 \text{Sin}[c+d x]}{3 a^2 d (1+\text{Cos}[c+d x])}-\frac{\text{Sin}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 152 leaves):

$$-\frac{1}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(6\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+8\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\text{Tan}\left[\frac{c}{2}\right]\right)$$

- **Problem 60: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 81 leaves, 6 steps):

$$-\frac{2\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}+\frac{10\,\text{Tan}[c+d\,x]}{3\,a^2\,d}-\frac{2\,\text{Tan}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Tan}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 239 leaves):

$$\frac{1}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+14\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+6\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\text{Sin}[d\,x]\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\right)+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\text{Tan}\left[\frac{c}{2}\right]\right)$$

- **Problem 61: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 119 leaves, 7 steps):

$$\frac{7\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^2\,d}-\frac{16\,\text{Tan}[c+d\,x]}{3\,a^2\,d}+\frac{7\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^2\,d}-\frac{8\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 292 leaves):

$$\frac{1}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(-2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]-40\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+\right.$$
$$3\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(-14\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+14\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\right.$$
$$\frac{1}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{1}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-(8\,\text{Sin}[d\,x])\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)-2\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Tan}\left[\frac{c}{2}\right]\right)$$

- **Problem 62: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^4}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 133 leaves, 7 steps):

$$-\frac{5\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}+\frac{12\,\text{Tan}[c+d\,x]}{a^2\,d}-\frac{5\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{a^2\,d}-\frac{10\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{4\,\text{Tan}[c+d\,x]^3}{a^2\,d}$$

Result (type 3, 403 leaves):

$$\frac{20\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}-$$
$$\frac{20\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{48\,d\,(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]\,\text{Sec}[c+d\,x]^3$$
$$\left(-3\,\text{Sin}\left[\frac{d\,x}{2}\right]+155\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-153\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+21\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-135\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+25\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+45\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-\right.$$
$$85\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+99\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+21\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+33\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-45\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+57\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+$$
$$\left.18\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+24\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-15\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+24\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+11\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+13\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 69: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 97 leaves, 5 steps):

$$\frac{\text{ArcTanh}[\text{Sin}[c+d x]]}{a^3 d}-\frac{\text{Sin}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{7 \text{Sin}[c+d x]}{15 a d (a+a \text{Cos}[c+d x])^2}-\frac{22 \text{Sin}[c+d x]}{15 d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 201 leaves):

$$-\frac{1}{15 a^3 d (1+\text{Cos}[c+d x])^3} 2 \text{Cos}\left[\frac{1}{2} (c+d x)\right] \left(60 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^5 \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)+3 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+14 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+88 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^4 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+3 \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Tan}\left[\frac{c}{2}\right]+14 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \text{Tan}\left[\frac{c}{2}\right]\right)$$

## Problem 70: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[c+d x]^2}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 112 leaves, 7 steps):

$$-\frac{3 \text{ArcTanh}[\text{Sin}[c+d x]]}{a^3 d}+\frac{24 \text{Tan}[c+d x]}{5 a^3 d}-\frac{\text{Tan}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{3 \text{Tan}[c+d x]}{5 a d (a+a \text{Cos}[c+d x])^2}-\frac{3 \text{Tan}[c+d x]}{d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 286 leaves):

$$\frac{1}{5 a^3 d (1+\text{Cos}[c+d x])^3} 2 \text{Cos}\left[\frac{1}{2} (c+d x)\right] \left(\text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+8 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+76 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^4 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+20 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^5 \left(3 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-3 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\text{Sin}[d x]\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)\right)+\text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Tan}\left[\frac{c}{2}\right]+8 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \text{Tan}\left[\frac{c}{2}\right]\right)$$

## Problem 71: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[c+d x]^3}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 156 leaves, 8 steps):

$$\frac{13 \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a^3 d}-\frac{152 \text{Tan}[c+d x]}{15 a^3 d}+\frac{13 \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a^3 d}-\frac{\text{Sec}[c+d x] \text{Tan}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{11 \text{Sec}[c+d x] \text{Tan}[c+d x]}{15 a d (a+a \text{Cos}[c+d x])^2}-\frac{76 \text{Sec}[c+d x] \text{Tan}[c+d x]}{15 d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 403 leaves):

$$-\frac{52\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$

$$\frac{52\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{1}{480\,d\,(a+a\,\text{Cos}[c+d\,x])^3}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2$$

$$\left(1235\,\text{Sin}\left[\frac{d\,x}{2}\right]-3805\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+4329\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-1989\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+3575\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+475\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-2005\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+\right.$$

$$2275\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-2673\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-105\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-1593\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+975\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-1325\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$

$$\left.255\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-875\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+195\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-304\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-90\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-214\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 80: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 135 leaves, 8 steps) :

$$-\frac{4\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^4\,d}+\frac{664\,\text{Tan}[c+d\,x]}{105\,a^4\,d}-\frac{88\,\text{Tan}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])^2}-$$

$$\frac{4\,\text{Tan}[c+d\,x]}{a^4\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Tan}[c+d\,x]}{7\,d\,(a+a\,\text{Cos}[c+d\,x])^4}-\frac{12\,\text{Tan}[c+d\,x]}{35\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

Result (type 3, 401 leaves) :

$$\frac{64\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^4}-\frac{64\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^4}+$$

$$\frac{1}{1680\,d\,(a+a\,\text{Cos}[c+d\,x])^4}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\left(-10\,780\,\text{Sin}\left[\frac{d\,x}{2}\right]+18\,788\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-20\,524\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+\right.$$

$$14\,644\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-16\,660\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-4690\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+14\,378\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-9100\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+$$

$$11\,668\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-630\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+9358\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-2940\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+4228\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+$$

$$\left.315\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3493\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-420\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+664\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+105\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+559\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 81: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 185 leaves, 9 steps) :

$$\frac{21\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^4\,d}-\frac{576\,\text{Tan}[c+d\,x]}{35\,a^4\,d}+\frac{21\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^4\,d}-\frac{43\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{35\,a^4\,d\,(1+\text{Cos}[c+d\,x])^2}-\frac{288\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{35\,a^4\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{7\,d\,(a+a\,\text{Cos}[c+d\,x])^4}-\frac{2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{5\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

Result (type 3, 455 leaves) :

$$-\frac{168\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^4}+\frac{168\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^4}+\frac{1}{2240\,d\,(a+a\,\text{Cos}[c+d\,x])^4}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]\,\text{Sec}[c+d\,x]^2$$
$$\Big(24402\,\text{Sin}\left[\frac{d\,x}{2}\right]-55556\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+61054\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-33614\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+51842\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+12460\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$
$$33716\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+34300\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-39788\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+2940\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-26068\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+16660$$
$$\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-21351\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-1295\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-14911\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+5145\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-7329\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-$$
$$1225\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-5369\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+735\,\text{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]-1152\,\text{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]-280\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]-872\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\Big)$$

## Problem 91: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^5}\,dx$$

Optimal (type 3, 168 leaves, 9 steps) :

$$-\frac{5\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^5\,d}+\frac{496\,\text{Tan}[c+d\,x]}{63\,a^5\,d}-\frac{\text{Tan}[c+d\,x]}{9\,d\,(a+a\,\text{Cos}[c+d\,x])^5}-\frac{5\,\text{Tan}[c+d\,x]}{21\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^4}-\frac{29\,\text{Tan}[c+d\,x]}{63\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{67\,\text{Tan}[c+d\,x]}{63\,a^3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{5\,\text{Tan}[c+d\,x]}{d\,\left(a^5+a^5\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 453 leaves) :

$$\frac{160\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{10}\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^5}-$$

$$\frac{160\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{10}\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^5}+\frac{1}{2016\,d\,(a+a\,\text{Cos}[c+d\,x])^5}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]$$

$$\left(-33978\,\text{Sin}\left[\frac{d\,x}{2}\right]+52002\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-56952\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+43722\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-47208\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-18144\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$

$$41796\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-28350\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+34578\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-5691\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+28719\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-$$

$$11550\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+15517\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-504\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+13186\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-2835\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+4149\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+$$

$$\left.252\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+3582\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-315\,\text{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]+496\,\text{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]+63\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+433\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 92: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^5}\,dx$$

Optimal (type 3, 224 leaves, 10 steps):

$$\frac{31\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^5\,d}-\frac{7664\,\text{Tan}[c+d\,x]}{315\,a^5\,d}+\frac{31\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^5\,d}-\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{9\,d\,(a+a\,\text{Cos}[c+d\,x])^5}-$$

$$\frac{17\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{63\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^4}-\frac{28\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{45\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{577\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{315\,a^3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{3832\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{315\,d\,\left(a^5+a^5\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 507 leaves):

$$-\frac{496\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{10}\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^5}+\frac{496\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{10}\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^5}+$$

$$\frac{1}{40\,320\,d\,(a+a\,\text{Cos}[c+d\,x])^5}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2$$

$$\left(1\,472\,562\,\text{Sin}\left[\frac{d\,x}{2}\right]-2\,822\,886\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+3\,057\,654\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-1\,885\,854\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+2\,644\,362\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+\right.$$

$$867\,048\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-1\,868\,436\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+1\,821\,498\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-2\,083\,537\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+339\,885\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$

$$1\,456\,687\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+966\,735\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-1\,195\,641\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+46\,515\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-$$

$$874\,341\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+367\,815\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-494\,579\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-31\,815\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-$$

$$374\,879\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+87\,885\,\text{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]-128\,187\,\text{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]-18\,585\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]-$$

$$\left.99\,837\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]+9765\,\text{Sin}\left[7\,c+\frac{11\,d\,x}{2}\right]-15\,328\,\text{Sin}\left[5\,c+\frac{13\,d\,x}{2}\right]-3150\,\text{Sin}\left[6\,c+\frac{13\,d\,x}{2}\right]-12\,178\,\text{Sin}\left[7\,c+\frac{13\,d\,x}{2}\right]\right)$$

- **Problem 100: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 37 leaves, 2 steps) :

$$\frac{2\,\sqrt{a}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}$$

Result (type 3, 1294 leaves) :

$$-\left(\left(\left(\left(\frac{1}{4}-\frac{i}{4}\right)\left(1+e^{ic}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{ic}{2}}+(16-16i)\,e^{\frac{3ic}{2}+idx}+(20+20i)\sqrt{2}\,e^{2ic+\frac{3idx}{2}}-(34-34i)\,e^{\frac{5ic}{2}+2idx}-(20+20i)\sqrt{2}\,e^{3ic+\frac{5idx}{2}}+\right.\right.\right.\right.$$
$$(16-16i)\,e^{\frac{7ic}{2}+3idx}+(4+4i)\sqrt{2}\,e^{4ic+\frac{7idx}{2}}-(1-i)\,e^{\frac{9ic}{2}+4idx}+8i\,e^{\frac{1}{2}i(c+dx)}-16\sqrt{2}\,e^{i(c+dx)}-40i\,e^{\frac{3}{2}i(c+dx)}+34\sqrt{2}\,e^{2i(c+dx)}+$$
$$\left.40i\,e^{\frac{5}{2}i(c+dx)}-16\sqrt{2}\,e^{3i(c+dx)}-8i\,e^{\frac{7}{2}i(c+dx)}+\sqrt{2}\,e^{4i(c+dx)}-(4+4i)\sqrt{2}\,e^{\frac{1}{2}i(2c+dx)}\right)x\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\Bigg)\Bigg/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{ic}{2}}\right)\left(-1+e^{ic}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+dx)}-4i\,e^{i(c+dx)}+2\sqrt{2}\,e^{\frac{3}{2}i(c+dx)}+i\,e^{2i(c+dx)}\right)^2\right)\right)-$$

$$\frac{i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{\sqrt{2}\,d}-$$

$$\frac{i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{\sqrt{2}\,d}-$$

$$\frac{\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{2\sqrt{2}\,d}-$$

$$\frac{\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{2\sqrt{2}\,d}-$$

$$\frac{2i\,\mathrm{ArcTan}\left[\frac{2i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Cot}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{d\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\frac{1}{d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)}$$
$$\sqrt{2}\,\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\;\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]$$
$$\left(-dx\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4i\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)$$

- **Problem 101: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+a\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 62 leaves, 3 steps):

$$\frac{\sqrt{a}\;\text{ArcTanh}\left[\frac{\sqrt{a}\;\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{a\,\text{Tan}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1426 leaves):

$$-\left(\left(\left(\left(\frac{1}{8}-\frac{i}{8}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$
$$\frac{i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\;\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,\sqrt{2}\,d}-$$
$$\frac{i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\;\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,\sqrt{2}\,d}-$$
$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Log}\left[2-\sqrt{2}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{4\,\sqrt{2}\,d}-$$
$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Log}\left[2+\sqrt{2}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{4\,\sqrt{2}\,d}-$$
$$\frac{i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Cot}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Bigg/$$

$$\left(\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 102: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 102 leaves, 4 steps) :

$$\frac{3\,\sqrt{a}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{3\,a\,\text{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1671 leaves) :

$$-\left(\left(\left(\left(\frac{3}{32}-\frac{3\,i}{32}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)x\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Bigg/$$

$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{3\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{8\,\sqrt{2}\,d}-$$

$$\frac{3\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{8\sqrt{2}\,d}-$$

$$\frac{3\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}-$$

$$\frac{3\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}-$$

$$\frac{3\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Cot}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{4\,d\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(3\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(4\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4\,d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(3\,\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)}{8\,d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4\,d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(-3\,\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)}{8\,d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 103: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 138 leaves, 5 steps):

$$\frac{5\sqrt{a}\ \text{ArcTanh}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{5\,a\,\text{Tan}[c+d\,x]}{8\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{5\,a\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1799 leaves):

$$-\Bigg(\Bigg(\Bigg(\left(\frac{5}{64}-\frac{5\,i}{64}\right)\left(1+e^{i\,c}\right)\Bigg(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Bigg)\times\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\Bigg)\Bigg/$$
$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\Bigg)-$$

$$\frac{5\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\ \text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\ \text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{16\sqrt{2}\,d}-$$

$$\frac{5\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\ \text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\ \text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{16\sqrt{2}\,d}-$$

$$\frac{5\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Log}\left[2-\sqrt{2}\ \text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\ \text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{32\sqrt{2}\,d}-$$

$$\frac{5\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Log}\left[2+\sqrt{2}\ \text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\ \text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{32\sqrt{2}\,d}-$$

$$\frac{5\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Cot}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{8\,d\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\Bigg(5\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Big/$$

$$\left(8\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{12\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(5\,\text{Cos}\left[\frac{c}{2}\right]-3\,\text{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{12\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(-5\,\text{Cos}\left[\frac{c}{2}\right]-3\,\text{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 108: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 66 leaves, 4 steps):

$$\frac{2\,a^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^2\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1404 leaves):

$$-\Bigg(\Bigg(\Big(\Big(\frac{1}{8}-\frac{i}{8}\Big)\left(1+e^{i c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16 i)\,e^{\frac{3 i c}{2}+i d x}+(20+20 i)\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34 i)\,e^{\frac{5 i c}{2}+2 i d x}-(20+20 i)\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+$$
$$(16-16 i)\,e^{\frac{7 i c}{2}+3 i d x}+(4+4 i)\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8 i\,e^{\frac{1}{2} i (c+d x)}-16\sqrt{2}\,e^{i (c+d x)}-40 i\,e^{\frac{3}{2} i (c+d x)}+34\sqrt{2}\,e^{2 i (c+d x)}+$$
$$40 i\,e^{\frac{5}{2} i (c+d x)}-16\sqrt{2}\,e^{3 i (c+d x)}-8 i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4 i)\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\Big)\,x\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^3\Big)\Big/$$
$$\Big(\Big((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\Big)\left(-1+e^{i c}\right)\Big(i-2\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4 i\,e^{i (c+d x)}+2\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\Big)^2\Big)\Bigg)-$$

$$\frac{i\,\text{ArcTan}\Big[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\Big]\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2\sqrt{2}\,d}-$$

$$\frac{i\,\text{ArcTan}\Big[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\Big]\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2\sqrt{2}\,d}-$$

$$\frac{(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\Big[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\Big]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{4\sqrt{2}\,d}-$$

$$\frac{(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\Big[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\Big]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{4\sqrt{2}\,d}+$$

$$\frac{\text{Cos}\left[\frac{d x}{2}\right]\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Sin}\left[\frac{c}{2}\right]}{d}-$$

$$\frac{i\,\text{ArcTan}\Big[\frac{2 i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\Big]\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{d\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\Bigg((a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Big/$$

$$\left(\sqrt{2}\,d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\mathrm{Cos}\left[\frac{c}{2}\right]\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d}$$

- **Problem 109: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 65 leaves, 4 steps) :

$$\frac{3\,a^{3/2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{a^2\,\mathrm{Tan}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 1449 leaves) :

$$-\Bigg(\Bigg(\Bigg(\left(\frac{3}{16}-\frac{3\,i}{16}\right)\left(1+e^{i\,c}\right)\Bigg(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Bigg)\times\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\Bigg)\Big/$$
$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\Bigg)-$$

$$\frac{3\,i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,\sqrt{2}\,d}-$$

$$\frac{3\,i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,\sqrt{2}\,d}-$$

$$\frac{3\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{8\,\sqrt{2}\,d}-$$

$$\frac{3\,(a\,(1+\cos[c+d\,x]))^{3/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\sin\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{8\,\sqrt{2}\,d}-$$

$$\frac{3\,i\,\mathrm{ArcTan}\left[\frac{2\,i\,\cos\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\sin\left[\frac{c}{2}\right]\right)\,\tan\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\cos\left[\frac{c}{2}\right]^2+4\,\sin\left[\frac{c}{2}\right]^2}}\right]\,(a\,(1+\cos[c+d\,x]))^{3/2}\,\cot\left[\frac{c}{2}\right]\,\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,\sqrt{-2+4\,\cos\left[\frac{c}{2}\right]^2+4\,\sin\left[\frac{c}{2}\right]^2}}+$$

$$\left(3\,(a\,(1+\cos[c+d\,x]))^{3/2}\,\csc\left[\frac{c}{2}\right]\,\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right.$$

$$\left.\left(-d\,x\,\cos\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\cos\left[\frac{d\,x}{2}\right]\,\sin\left[\frac{c}{2}\right]+2\,\cos\left[\frac{c}{2}\right]\,\sin\left[\frac{d\,x}{2}\right]\right]\,\sin\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\cos\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\sin\left[\frac{c}{2}\right]\right)\,\tan\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\cos\left[\frac{c}{2}\right]^2+4\,\sin\left[\frac{c}{2}\right]^2}}\right]\,\cos\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\cos\left[\frac{c}{2}\right]^2+4\,\sin\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(2\,\sqrt{2}\,d\,\left(4\,\cos\left[\frac{c}{2}\right]^2+4\,\sin\left[\frac{c}{2}\right]^2\right)\right)+\frac{(a\,(1+\cos[c+d\,x]))^{3/2}\,\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,d\,\left(\cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sin\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-\frac{(a\,(1+\cos[c+d\,x]))^{3/2}\,\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,d\,\left(\cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\sin\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 110: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\cos[c+d\,x])^{3/2}\,\sec[c+d\,x]^3\,dx$$

Optimal (type 3, 106 leaves, 5 steps):

$$\frac{7\,a^{3/2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{a+a\,\cos[c+d\,x]}}\right]}{4\,d}+\frac{7\,a^2\,\tan[c+d\,x]}{4\,d\,\sqrt{a+a\,\cos[c+d\,x]}}+\frac{a^2\,\sec[c+d\,x]\,\tan[c+d\,x]}{2\,d\,\sqrt{a+a\,\cos[c+d\,x]}}$$

Result (type 3, 1693 leaves):

$$-\left(\left(\left(\left(\frac{7}{64}-\frac{7\,i}{64}\right)\,\left(1+e^{i\,c}\right)\,\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$40\,i\,e^{\frac{5}{2}i(c+dx)} - 16\sqrt{2}\,e^{3i(c+dx)} - 8\,i\,e^{\frac{7}{2}i(c+dx)} + \sqrt{2}\,e^{4i(c+dx)} - (4+4\,i)\sqrt{2}\,e^{\frac{1}{2}i(2c+dx)}\Big)\,x\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^3\Big)\Big/$$

$$\Big(\Big(\Big((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\Big)\,\big(-1+e^{i c}\big)\,\Big(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+dx)} - 4\,i\,e^{i(c+dx)} + 2\sqrt{2}\,e^{\frac{3}{2}i(c+dx)} + i\,e^{2i(c+dx)}\Big)^2\Big)\Big) -$$

$$\frac{7\,i\,\mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}{-\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}\Big]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3}{16\sqrt{2}\,d} -$$

$$\frac{7\,i\,\mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]+\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}{\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}\Big]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3}{16\sqrt{2}\,d} -$$

$$\frac{7\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Log}\Big[2-\sqrt{2}\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d\,x}{2}\big]-\sqrt{2}\,\mathrm{Sin}\big[\frac{c}{2}+\frac{d\,x}{2}\big]\Big]\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3}{32\sqrt{2}\,d} -$$

$$\frac{7\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Log}\Big[2+\sqrt{2}\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d\,x}{2}\big]-\sqrt{2}\,\mathrm{Sin}\big[\frac{c}{2}+\frac{d\,x}{2}\big]\Big]\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3}{32\sqrt{2}\,d} -$$

$$\frac{7\,i\,\mathrm{ArcTan}\Big[\frac{2\,i\,\mathrm{Cos}[\frac{c}{2}]-i\,\big(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\big)\,\mathrm{Tan}[\frac{dx}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Cot}\big[\frac{c}{2}\big]\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3}{8\,d\,\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}} +$$

$$\left(7\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Csc}\Big[\frac{c}{2}\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^3\right.$$

$$\left(-d\,x\,\mathrm{Cos}\Big[\frac{c}{2}\Big]+2\,\mathrm{Log}\Big[\sqrt{2}+2\,\mathrm{Cos}\Big[\frac{d\,x}{2}\Big]\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+2\,\mathrm{Cos}\Big[\frac{c}{2}\Big]\,\mathrm{Sin}\Big[\frac{d\,x}{2}\Big]\Big]\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\Big[\frac{2\,i\,\mathrm{Cos}[\frac{c}{2}]-i\,\big(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\big)\,\mathrm{Tan}[\frac{dx}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,\mathrm{Cos}[\frac{c}{2}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\right)\Bigg)\Bigg/$$

$$\left(8\sqrt{2}\, d \left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(7\,\text{Cos}\left[\frac{c}{2}\right]-5\,\text{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-7\,\text{Cos}\left[\frac{c}{2}\right]-5\,\text{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 111: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 144 leaves, 6 steps):

$$\frac{11\,a^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{11\,a^2\,\text{Tan}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{11\,a^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1825 leaves):

$$-\left(\left(\left(\left(\frac{11}{128}-\frac{11\,i}{128}\right)\,\left(1+e^{i\,c}\right)\,\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right)\Bigg/$$

$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\,\left(-1+e^{i\,c}\right)\,\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{11\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{32\,\sqrt{2}\,d}-$$

$$\frac{11\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{32\,\sqrt{2}\,d}-$$

$$\frac{11\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{64\,\sqrt{2}\,d}-$$

$$\frac{11\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{64\,\sqrt{2}\,d}-$$

$$\frac{11\,\mathbb{i}\,\text{ArcTan}\left[\frac{2\,\mathbb{i}\,\text{Cos}\left[\frac{c}{2}\right]-\mathbb{i}\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{16\,d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(11\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,\mathbb{i}\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,\mathbb{i}\,\text{Cos}\left[\frac{c}{2}\right]-\mathbb{i}\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(16\,\sqrt{2}\,d\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{3\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(11\,\text{Cos}\left[\frac{c}{2}\right]-5\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{3\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-11\,\text{Cos}\left[\frac{c}{2}\right]-5\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 116: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 98 leaves, 4 steps):

$$\frac{2\,a^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{14\,a^3\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,a^2\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 1513 leaves):

$$-\left(\left(\left(\left(\frac{1}{16}-\frac{i}{16}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\times(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right)\Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$

$$\frac{i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}-$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}+$$

$$\frac{5\,\text{Cos}\left[\frac{d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{c}{2}\right]}{4\,d}-$$

$$\frac{\mathrm{i}\,\mathrm{ArcTan}\Big[\frac{2\,\mathrm{i}\,\mathrm{Cos}[\frac{c}{2}]-\mathrm{i}\,\left(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\right)\,\mathrm{Tan}[\frac{d\,x}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Cot}[\frac{c}{2}]\,\mathrm{Sec}[\frac{c}{2}+\frac{d\,x}{2}]^5}{2\,d\,\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}+$$

$$\left((a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Csc}\Big[\frac{c}{2}\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\right.$$

$$\left(-d\,x\,\mathrm{Cos}\Big[\frac{c}{2}\Big]+2\,\mathrm{Log}\Big[\sqrt{2}+2\,\mathrm{Cos}\Big[\frac{d\,x}{2}\Big]\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+2\,\mathrm{Cos}\Big[\frac{c}{2}\Big]\,\mathrm{Sin}\Big[\frac{d\,x}{2}\Big]\Big]\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+\frac{4\,\mathrm{i}\,\sqrt{2}\,\mathrm{ArcTan}\Big[\frac{2\,\mathrm{i}\,\mathrm{Cos}[\frac{c}{2}]-\mathrm{i}\,\left(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\right)\,\mathrm{Tan}[\frac{d\,x}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,\mathrm{Cos}[\frac{c}{2}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\right)\Bigg)\Bigg/$$

$$\left(2\,\sqrt{2}\,d\,\left(4\,\mathrm{Cos}\Big[\frac{c}{2}\Big]^2+4\,\mathrm{Sin}\Big[\frac{c}{2}\Big]^2\right)\right)+\frac{\mathrm{Cos}[\frac{3\,d\,x}{2}]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}[\frac{c}{2}+\frac{d\,x}{2}]^5\,\mathrm{Sin}[\frac{3\,c}{2}]}{12\,d}+$$

$$\frac{5\,\mathrm{Cos}[\frac{c}{2}]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}[\frac{c}{2}+\frac{d\,x}{2}]^5\,\mathrm{Sin}[\frac{d\,x}{2}]}{4\,d}+$$

$$\frac{\mathrm{Cos}[\frac{3\,c}{2}]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}[\frac{c}{2}+\frac{d\,x}{2}]^5\,\mathrm{Sin}[\frac{3\,d\,x}{2}]}{12\,d}$$

- **Problem 117: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 92 leaves, 4 steps):

$$\frac{5\,a^{5/2}\,\mathrm{ArcTanh}\Big[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\Big]}{d}+\frac{a^3\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 1547 leaves):

$$-\left(\left(\left(\left(\frac{5}{32}-\frac{5\,\mathrm{i}}{32}\right)\,\left(1+e^{\mathrm{i}\,c}\right)\,\left(\sqrt{2}-(1-\mathrm{i})\,e^{\frac{\mathrm{i}\,c}{2}}+(16-16\,\mathrm{i})\,e^{\frac{3\,\mathrm{i}\,c}{2}+\mathrm{i}\,d\,x}+(20+20\,\mathrm{i})\,\sqrt{2}\,e^{2\,\mathrm{i}\,c+\frac{3\,\mathrm{i}\,d\,x}{2}}-(34-34\,\mathrm{i})\,e^{\frac{5\,\mathrm{i}\,c}{2}+2\,\mathrm{i}\,d\,x}-(20+20\,\mathrm{i})\,\sqrt{2}\,e^{3\,\mathrm{i}\,c+\frac{5\,\mathrm{i}\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,\mathrm{i})\,e^{\frac{7\,\mathrm{i}\,c}{2}+3\,\mathrm{i}\,d\,x}+(4+4\,\mathrm{i})\,\sqrt{2}\,e^{4\,\mathrm{i}\,c+\frac{7\,\mathrm{i}\,d\,x}{2}}-(1-\mathrm{i})\,e^{\frac{9\,\mathrm{i}\,c}{2}+4\,\mathrm{i}\,d\,x}+8\,\mathrm{i}\,e^{\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}-16\,\sqrt{2}\,e^{\mathrm{i}\,(c+d\,x)}-40\,\mathrm{i}\,e^{\frac{3}{2}\,\mathrm{i}\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,\mathrm{i}\,(c+d\,x)}+$$

$$40\,i\,e^{\frac{5}{2}i(c+dx)}-16\sqrt{2}\,e^{3i(c+dx)}-8\,i\,e^{\frac{7}{2}i(c+dx)}+\sqrt{2}\,e^{4i(c+dx)}-(4+4\,i)\sqrt{2}\,e^{\frac{1}{2}i(2c+dx)}\Big)\,x\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{dx}{2}\Big]^5\Big)\Big/$$

$$\Big(\Big(\big((-1-i)+\sqrt{2}\,e^{\frac{ic}{2}}\big)\big(-1+e^{ic}\big)\Big(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+dx)}-4\,i\,e^{i(c+dx)}+2\sqrt{2}\,e^{\frac{3}{2}i(c+dx)}+i\,e^{2i(c+dx)}\Big)^2\Big)\Big)-$$

$$\frac{5\,i\,\mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}{-\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}\Big]\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{8\sqrt{2}\,d}-$$

$$\frac{5\,i\,\mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]+\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}{\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{dx}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{dx}{4}]}\Big]\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{8\sqrt{2}\,d}-$$

$$\frac{5\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Log}\Big[2-\sqrt{2}\,\mathrm{Cos}[\frac{c}{2}+\frac{dx}{2}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{2}+\frac{dx}{2}]\Big]\,\mathrm{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{16\sqrt{2}\,d}-$$

$$\frac{5\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Log}\Big[2+\sqrt{2}\,\mathrm{Cos}[\frac{c}{2}+\frac{dx}{2}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{2}+\frac{dx}{2}]\Big]\,\mathrm{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{16\sqrt{2}\,d}+$$

$$\frac{\mathrm{Cos}[\frac{dx}{2}]\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Sec}[\frac{c}{2}+\frac{dx}{2}]^5\,\mathrm{Sin}[\frac{c}{2}]}{2d}-$$

$$\frac{5\,i\,\mathrm{ArcTan}\Big[\frac{2\,i\,\mathrm{Cos}[\frac{c}{2}]-i\,\big(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\big)\,\mathrm{Tan}[\frac{dx}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Cot}[\frac{c}{2}]\,\mathrm{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{4d\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}+$$

$$\Bigg(5\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Csc}\Big[\frac{c}{2}\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{dx}{2}\Big]^5$$

$$\Bigg(-dx\,\mathrm{Cos}\Big[\frac{c}{2}\Big]+2\,\mathrm{Log}\Big[\sqrt{2}+2\,\mathrm{Cos}\Big[\frac{dx}{2}\Big]\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+2\,\mathrm{Cos}\Big[\frac{c}{2}\Big]\,\mathrm{Sin}\Big[\frac{dx}{2}\Big]\Big]\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+\frac{4\,i\sqrt{2}\,\mathrm{ArcTan}\Big[\frac{2\,i\,\mathrm{Cos}[\frac{c}{2}]-i\,\big(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\big)\,\mathrm{Tan}[\frac{dx}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,\mathrm{Cos}[\frac{c}{2}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Bigg)\Bigg)\Bigg/$$

$$\left(4\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\text{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+$$
$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 118: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 106 leaves, 4 steps):

$$\frac{19\,a^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{9\,a^3\,\text{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 1693 leaves):

$$-\left(\left(\left(\left(\frac{19}{128}-\frac{19\,i}{128}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\Bigg)\Bigg/$$
$$\left(\left(\left(-1-i\right)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\Bigg)-$$
$$\frac{19\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{32\,\sqrt{2}\,d}-$$
$$\frac{19\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{32\,\sqrt{2}\,d}-$$
$$\frac{19\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{64\,\sqrt{2}\,d}-$$
$$\frac{19\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{64\,\sqrt{2}\,d}-$$

$$\frac{19\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Cot}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{16\,d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(19\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(16\,\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(11\,\text{Cos}\left[\frac{c}{2}\right]-9\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(-11\,\text{Cos}\left[\frac{c}{2}\right]-9\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 119: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 144 leaves, 5 steps):

$$\frac{25\,a^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{25\,a^3\,\text{Tan}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{13\,a^3\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 1825 leaves):

$$-\left(\left(\left(\left(\frac{25}{256}-\frac{25\,i}{256}\right)\left(1+e^{i c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16 i)\,e^{\frac{3 i c}{2}+i d x}+(20+20 i)\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34 i)\,e^{\frac{5 i c}{2}+2 i d x}-(20+20 i)\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+(16-16 i)\,e^{\frac{7 i c}{2}+3 i d x}+(4+4 i)\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8 i\,e^{\frac{1}{2} i (c+d x)}-16\sqrt{2}\,e^{i (c+d x)}-40 i\,e^{\frac{3}{2} i (c+d x)}+34\sqrt{2}\,e^{2 i (c+d x)}+40 i\,e^{\frac{5}{2} i (c+d x)}-16\sqrt{2}\,e^{3 i (c+d x)}-8 i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4 i)\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\right) x\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\right)\Big/\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4 i\,e^{i (c+d x)}+2\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\right)^2\right)\right)-$$

$$\frac{25\,i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right](a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{64\sqrt{2}\,d}-$$

$$\frac{25\,i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right](a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{64\sqrt{2}\,d}-$$

$$\frac{25\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{128\sqrt{2}\,d}-$$

$$\frac{25\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{128\sqrt{2}\,d}-$$

$$\frac{25\,i\,\mathrm{ArcTan}\left[\frac{2 i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right](a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Cot}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{32\,d\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(25\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\right.$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg)\Big/$$

$$\left(32\,\sqrt{2}\,d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{48\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{5\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{32\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{5\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(5\,\mathrm{Cos}\left[\frac{c}{2}\right]-3\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{48\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{5\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{32\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}-$$

$$\frac{5\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(5\,\mathrm{Cos}\left[\frac{c}{2}\right]+3\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 120: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 182 leaves, 6 steps) :

$$\frac{163\,a^{5/2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{163\,a^3\,\mathrm{Tan}[c+d\,x]}{64\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{163\,a^3\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{96\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{17\,a^3\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{24\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 2069 leaves) :

$$-\left(\left(\left(\left(\frac{163}{2048}-\frac{163\,i}{2048}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$40\,i\,e^{\frac{5}{2}i(c+dx)} - 16\sqrt{2}\,e^{3i(c+dx)} - 8\,i\,e^{\frac{7}{2}i(c+dx)} + \sqrt{2}\,e^{4i(c+dx)} - (4+4i)\sqrt{2}\,e^{\frac{1}{2}i(2c+dx)}\Bigg)\,x\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\Big[\frac{c}{2}+\frac{dx}{2}\Big]^5\Bigg)\Bigg/$$

$$\left(\left(\left((-1-i)+\sqrt{2}\,e^{\frac{ic}{2}}\right)\left(-1+e^{ic}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+dx)}-4\,i\,e^{i(c+dx)}+2\sqrt{2}\,e^{\frac{3}{2}i(c+dx)}+i\,e^{2i(c+dx)}\right)^2\right)\right) -$$

$$\frac{163\,i\,\text{ArcTan}\Big[\frac{\text{Cos}[\frac{c}{4}+\frac{dx}{4}]-\text{Sin}[\frac{c}{4}+\frac{dx}{4}]-\sqrt{2}\,\text{Sin}[\frac{c}{4}+\frac{dx}{4}]}{-\text{Cos}[\frac{c}{4}+\frac{dx}{4}]+\sqrt{2}\,\text{Cos}[\frac{c}{4}+\frac{dx}{4}]-\text{Sin}[\frac{c}{4}+\frac{dx}{4}]}\Big]\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{512\sqrt{2}\,d} -$$

$$\frac{163\,i\,\text{ArcTan}\Big[\frac{\text{Cos}[\frac{c}{4}+\frac{dx}{4}]+\text{Sin}[\frac{c}{4}+\frac{dx}{4}]-\sqrt{2}\,\text{Sin}[\frac{c}{4}+\frac{dx}{4}]}{\text{Cos}[\frac{c}{4}+\frac{dx}{4}]+\sqrt{2}\,\text{Cos}[\frac{c}{4}+\frac{dx}{4}]-\text{Sin}[\frac{c}{4}+\frac{dx}{4}]}\Big]\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{512\sqrt{2}\,d} -$$

$$\frac{163\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Log}\Big[2-\sqrt{2}\,\text{Cos}[\frac{c}{2}+\frac{dx}{2}]-\sqrt{2}\,\text{Sin}[\frac{c}{2}+\frac{dx}{2}]\Big]\,\text{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{1024\sqrt{2}\,d} -$$

$$\frac{163\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Log}\Big[2+\sqrt{2}\,\text{Cos}[\frac{c}{2}+\frac{dx}{2}]-\sqrt{2}\,\text{Sin}[\frac{c}{2}+\frac{dx}{2}]\Big]\,\text{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{1024\sqrt{2}\,d} -$$

$$\frac{163\,i\,\text{ArcTan}\Big[\frac{2\,i\,\text{Cos}[\frac{c}{2}]-i\left(-\sqrt{2}+2\,\text{Sin}[\frac{c}{2}]\right)\text{Tan}[\frac{dx}{4}]}{\sqrt{-2+4\,\text{Cos}[\frac{c}{2}]^2+4\,\text{Sin}[\frac{c}{2}]^2}}\Big]\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Cot}[\frac{c}{2}]\,\text{Sec}[\frac{c}{2}+\frac{dx}{2}]^5}{256\,d\,\sqrt{-2+4\,\text{Cos}[\frac{c}{2}]^2+4\,\text{Sin}[\frac{c}{2}]^2}} +$$

$$\left(163\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Csc}\Big[\frac{c}{2}\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{dx}{2}\Big]^5\right.$$

$$\left(-d\,x\,\text{Cos}\Big[\frac{c}{2}\Big]+2\,\text{Log}\Big[\sqrt{2}+2\,\text{Cos}\Big[\frac{dx}{2}\Big]\,\text{Sin}\Big[\frac{c}{2}\Big]+2\,\text{Cos}\Big[\frac{c}{2}\Big]\,\text{Sin}\Big[\frac{dx}{2}\Big]\Big]\,\text{Sin}\Big[\frac{c}{2}\Big]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\Big[\frac{2\,i\,\text{Cos}[\frac{c}{2}]-i\left(-\sqrt{2}+2\,\text{Sin}[\frac{c}{2}]\right)\text{Tan}[\frac{dx}{4}]}{\sqrt{-2+4\,\text{Cos}[\frac{c}{2}]^2+4\,\text{Sin}[\frac{c}{2}]^2}}\Big]\,\text{Cos}[\frac{c}{2}]}{\sqrt{-2+4\,\text{Cos}[\frac{c}{2}]^2+4\,\text{Sin}[\frac{c}{2}]^2}}\right)\Bigg)\Bigg/$$

$$\left(256\sqrt{2}\,d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(23\,\mathrm{Cos}\left[\frac{c}{2}\right]-17\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{43\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{256\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(163\,\mathrm{Cos}\left[\frac{c}{2}\right]-77\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(-23\,\mathrm{Cos}\left[\frac{c}{2}\right]-17\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{43\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{256\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(-163\,\mathrm{Cos}\left[\frac{c}{2}\right]-77\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 127: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\mathrm{Sec}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 85 leaves, 5 steps):

$$\frac{2\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 1413 leaves):

$$-\left(\left(\left(\left(\frac{1}{2}-\frac{i}{2}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$

$$34\sqrt{2}\,\mathbb{e}^{2\,\mathbb{i}\,(c+d\,x)}+40\,\mathbb{i}\,\mathbb{e}^{\frac{5}{2}\,\mathbb{i}\,(c+d\,x)}-16\sqrt{2}\,\mathbb{e}^{3\,\mathbb{i}\,(c+d\,x)}-8\,\mathbb{i}\,\mathbb{e}^{\frac{7}{2}\,\mathbb{i}\,(c+d\,x)}+\sqrt{2}\,\mathbb{e}^{4\,\mathbb{i}\,(c+d\,x)}-(4+4\,\mathbb{i})\sqrt{2}\,\mathbb{e}^{\frac{1}{2}\,\mathbb{i}\,(2\,c+d\,x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\Big)\Big/$$

$$\left(\left((-1-\mathbb{i})+\sqrt{2}\,\mathbb{e}^{\frac{\mathbb{i}\,c}{2}}\right)\left(-1+\mathbb{e}^{\mathbb{i}\,c}\right)\left(\mathbb{i}-2\sqrt{2}\,\mathbb{e}^{\frac{1}{2}\,\mathbb{i}\,(c+d\,x)}-4\,\mathbb{i}\,\mathbb{e}^{\mathbb{i}\,(c+d\,x)}+2\sqrt{2}\,\mathbb{e}^{\frac{3}{2}\,\mathbb{i}\,(c+d\,x)}+\mathbb{i}\,\mathbb{e}^{2\,\mathbb{i}\,(c+d\,x)}\right)^2\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)\right)-$$

$$\frac{\mathbb{i}\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-$$

$$\frac{\mathbb{i}\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-$$

$$\frac{4\,\mathbb{i}\,\text{ArcTan}\left[\frac{2\,\mathbb{i}\,\text{Cos}\left[\frac{c}{2}\right]-\mathbb{i}\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cot}\left[\frac{c}{2}\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\Bigg(2\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Csc}\left[\frac{c}{2}\right]$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)$$

- **Problem 128: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^2}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 108 leaves, 6 steps):

$$-\frac{\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\text{Tan}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1540 leaves):

$$\left(\left(\frac{1}{4}-\frac{i}{4}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$

$$\left.\left.34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/$$

$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)+$$

$$\frac{i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{\sqrt{2}\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{\sqrt{2}\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{2\,\sqrt{2}\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{2\,\sqrt{2}\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{2\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Cot}\left[\frac{c}{2}\right]}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}-\left(\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 129: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^3}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 147 leaves, 7 steps):

$$\frac{7\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,\sqrt{a}\,d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\text{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1791 leaves):

$$-\left(\left(\left(\left(\frac{7}{16}-\frac{7\,i}{16}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$

$$34\sqrt{2}\, e^{2 i (c+d x)} + 40\, i\, e^{\frac{5}{2} i (c+d x)} - 16\sqrt{2}\, e^{3 i (c+d x)} - 8\, i\, e^{\frac{7}{2} i (c+d x)} + \sqrt{2}\, e^{4 i (c+d x)} - (4+4 i)\sqrt{2}\, e^{\frac{1}{2} i (2 c+d x)}\Big)\, x \,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d x}{2}\Big]\Big) \Big/$$

$$\Big(\Big(\big((-1-i)+\sqrt{2}\, e^{\frac{i c}{2}}\big)\big(-1+e^{i c}\big)\Big(i - 2\sqrt{2}\, e^{\frac{1}{2} i (c+d x)} - 4\, i\, e^{i (c+d x)} + 2\sqrt{2}\, e^{\frac{3}{2} i (c+d x)} + i\, e^{2 i (c+d x)}\Big)^2 \sqrt{a\,(1+\mathrm{Cos}[c+d x])}\Big)\Big) -$$

$$\frac{7\, i\, \mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{d x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d x}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{d x}{4}]}{-\mathrm{Cos}[\frac{c}{4}+\frac{d x}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{d x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d x}{4}]}\Big]\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]}{4\sqrt{2}\, d\, \sqrt{a\,(1+\mathrm{Cos}[c+d x])}} -$$

$$\frac{7\, i\, \mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{d x}{4}]+\mathrm{Sin}[\frac{c}{4}+\frac{d x}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{d x}{4}]}{\mathrm{Cos}[\frac{c}{4}+\frac{d x}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{d x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d x}{4}]}\Big]\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]}{4\sqrt{2}\, d\, \sqrt{a\,(1+\mathrm{Cos}[c+d x])}} +$$

$$\frac{2\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]\,\mathrm{Log}\big[\mathrm{Cos}\big[\frac{c}{4}+\frac{d x}{4}\big]-\mathrm{Sin}\big[\frac{c}{4}+\frac{d x}{4}\big]\big]}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d x])}} -$$

$$\frac{2\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]\,\mathrm{Log}\big[\mathrm{Cos}\big[\frac{c}{4}+\frac{d x}{4}\big]+\mathrm{Sin}\big[\frac{c}{4}+\frac{d x}{4}\big]\big]}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d x])}} -$$

$$\frac{7\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]\,\mathrm{Log}\Big[2-\sqrt{2}\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]-\sqrt{2}\,\mathrm{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]\Big]}{8\sqrt{2}\, d\,\sqrt{a\,(1+\mathrm{Cos}[c+d x])}} -$$

$$\frac{7\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]\,\mathrm{Log}\Big[2+\sqrt{2}\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]-\sqrt{2}\,\mathrm{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]\Big]}{8\sqrt{2}\, d\,\sqrt{a\,(1+\mathrm{Cos}[c+d x])}} -$$

$$\frac{7\, i\, \mathrm{ArcTan}\Big[\frac{2\, i\,\mathrm{Cos}[\frac{c}{2}]-i\,\big(-\sqrt{2}+2\,\mathrm{Sin}[\frac{c}{2}]\big)\,\mathrm{Tan}[\frac{d x}{4}]}{\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}}\Big]\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d x}{2}\big]\,\mathrm{Cot}\big[\frac{c}{2}\big]}{2\, d\,\sqrt{a\,(1+\mathrm{Cos}[c+d x])}\,\sqrt{-2+4\,\mathrm{Cos}[\frac{c}{2}]^2+4\,\mathrm{Sin}[\frac{c}{2}]^2}} +$$

$$\Bigg(7\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d x}{2}\Big]\,\mathrm{Csc}\Big[\frac{c}{2}\Big]$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(2\,\sqrt{2}\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{2\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(-\text{Cos}\left[\frac{c}{2}\right]+3\,\text{Sin}\left[\frac{c}{2}\right]\right)}{4\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{2\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+3\,\text{Sin}\left[\frac{c}{2}\right]\right)}{4\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 130: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^4}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 181 leaves, 8 steps):

$$-\frac{9\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,\sqrt{a}\,d}+\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{7\,\text{Tan}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1921 leaves):

$$\left(\left(\frac{9}{32}-\frac{9\,i}{32}\right)\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$

$$\left.\left.34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/$$

$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)+$$

$$\frac{9\, i\, \text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\, \text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{8 \sqrt{2}\, d \sqrt{a\, (1+\text{Cos}[c+d x])}}+$$

$$\frac{9\, i\, \text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\, \text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{8 \sqrt{2}\, d \sqrt{a\, (1+\text{Cos}[c+d x])}}-$$

$$\frac{2\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d \sqrt{a\, (1+\text{Cos}[c+d x])}}+$$

$$\frac{2\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d \sqrt{a\, (1+\text{Cos}[c+d x])}}+$$

$$\frac{9\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Log}\left[2-\sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{16 \sqrt{2}\, d \sqrt{a\, (1+\text{Cos}[c+d x])}}+$$

$$\frac{9\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Log}\left[2+\sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{16 \sqrt{2}\, d \sqrt{a\, (1+\text{Cos}[c+d x])}}+$$

$$\frac{9\, i\, \text{ArcTan}\left[\frac{2\, i\, \text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cot}\left[\frac{c}{2}\right]}{4\, d \sqrt{a\, (1+\text{Cos}[c+d x])} \sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}-\left(9\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left(\left(-d x\, \text{Cos}\left[\frac{c}{2}\right]+2\, \text{Log}\left[\sqrt{2}+2\, \text{Cos}\left[\frac{d x}{2}\right] \text{Sin}\left[\frac{c}{2}\right]+2\, \text{Cos}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]\right] \text{Sin}\left[\frac{c}{2}\right]+\frac{4\, i \sqrt{2}\, \text{ArcTan}\left[\frac{2\, i\, \text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] \text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Bigg/$$

$$\left(4 \sqrt{2}\, d \sqrt{a\, (1+\text{Cos}[c+d x])} \left(4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{6\, d \sqrt{a\, (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]}{4\, d \sqrt{a\, (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(7\,\text{Cos}\left[\frac{c}{2}\right]-9\,\text{Sin}\left[\frac{c}{2}\right]\right)}{8\,d\,\sqrt{a\,(1+\text{Cos}[c+d x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{6\,d\,\sqrt{a\,(1+\text{Cos}[c+d x])}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\,\text{Sin}\left[\frac{d x}{2}\right]}{4\,d\,\sqrt{a\,(1+\text{Cos}[c+d x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(-7\,\text{Cos}\left[\frac{c}{2}\right]-9\,\text{Sin}\left[\frac{c}{2}\right]\right)}{8\,d\,\sqrt{a\,(1+\text{Cos}[c+d x])}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 136: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sec}[c+d x]}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 114 leaves, 6 steps):

$$\frac{2\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{3/2}\,d}-\frac{5\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{\text{Sin}[c+d x]}{2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 1787 leaves):

$$-\Bigg(\Bigg((1-i)\left(1+e^{i c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16 i)\,e^{\frac{3 i c}{2}+i d x}+(20+20 i)\,\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34 i)\,e^{\frac{5 i c}{2}+2 i d x}-(20+20 i)\,\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+$$
$$(16-16 i)\,e^{\frac{7 i c}{2}+3 i d x}+(4+4 i)\,\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8 i\,e^{\frac{1}{2} i (c+d x)}-16\,\sqrt{2}\,e^{i (c+d x)}-40 i\,e^{\frac{3}{2} i (c+d x)}+$$
$$34\,\sqrt{2}\,e^{2 i (c+d x)}+40 i\,e^{\frac{5}{2} i (c+d x)}-16\,\sqrt{2}\,e^{3 i (c+d x)}-8 i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4 i)\,\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\Bigg)\Big/$$
$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4 i\,e^{i (c+d x)}+2\,\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\right)^2\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\right)\Bigg)-$$

$$\frac{2 i\,\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}+$$

$$\frac{5\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\frac{5\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\frac{\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}+$$

$$\left((1-i)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right.$$

$$\left.\left((-1-i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(\left(\frac{1}{2}+\frac{i}{2}\right)\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right.$$

$$\left.\left((-1-i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\frac{8\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cot}\left[\frac{c}{2}\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+\left(4\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)-\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 137: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 144 leaves, 7 steps) :

$$-\frac{3\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{9\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{\text{Tan}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{3\,\text{Tan}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1691 leaves) :

$$\Bigg(\left(\frac{3}{2}-\frac{3\,i}{2}\right)\left(1+e^{i\,c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$
$$34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\Bigg)\Bigg/$$
$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\right)+$$
$$\frac{3\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}+$$
$$\frac{3\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}-$$
$$\frac{9\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}+$$
$$\frac{9\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}+$$
$$\frac{3\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}+$$
$$\frac{3\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}+$$
$$\frac{12\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cot}\left[\frac{c}{2}\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}-\Bigg(6\,\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Csc}\left[\frac{c}{2}\right]$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Bigg/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}-$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 138: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 185 leaves, 8 steps):

$$\frac{19\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,a^{3/2}\,d}-\frac{13\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{7\,\text{Tan}[c+d\,x]}{4\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1941 leaves):

$$-\left(\left(\left(\left(\frac{19}{8}-\frac{19\,i}{8}\right)\,\left(1+e^{i\,c}\right)\,\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$

$$\left.\left.34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right)\Bigg/$$

$$\left(\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\,\left(-1+e^{i\,c}\right)\,\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\right)\right)-$$

$$\frac{19\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}-$$

$$\frac{19\,i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}+$$

$$\frac{13\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\frac{13\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\frac{19\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{4\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\frac{19\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{4\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\frac{19\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Cot}\left[\frac{c}{2}\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(19\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)-\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\mathrm{Cos}[c+d x]))^{3/2} \left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \mathrm{Sin}\left[\frac{d x}{2}\right]}{d (a (1+\mathrm{Cos}[c+d x]))^{3/2} \left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right) \left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(-5 \mathrm{Cos}\left[\frac{c}{2}\right]+7 \mathrm{Sin}\left[\frac{c}{2}\right]\right)}{2 d (a (1+\mathrm{Cos}[c+d x]))^{3/2} \left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right) \left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \mathrm{Sin}\left[\frac{d x}{2}\right]}{d (a (1+\mathrm{Cos}[c+d x]))^{3/2} \left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right) \left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(5 \mathrm{Cos}\left[\frac{c}{2}\right]+7 \mathrm{Sin}\left[\frac{c}{2}\right]\right)}{2 d (a (1+\mathrm{Cos}[c+d x]))^{3/2} \left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right) \left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 139: Result more than twice size of optimal antiderivative.**

$$\int \frac{\mathrm{Cos}[c+d x]^4}{(a+a \mathrm{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 183 leaves, 7 steps):

$$\frac{163 \mathrm{ArcTanh}\left[\frac{\sqrt{a} \mathrm{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \mathrm{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-\frac{\mathrm{Cos}[c+d x]^3 \mathrm{Sin}[c+d x]}{4 d (a+a \mathrm{Cos}[c+d x])^{5/2}}-$$

$$\frac{17 \mathrm{Cos}[c+d x]^2 \mathrm{Sin}[c+d x]}{16 a d (a+a \mathrm{Cos}[c+d x])^{3/2}}-\frac{197 \mathrm{Sin}[c+d x]}{24 a^2 d \sqrt{a+a \mathrm{Cos}[c+d x]}}+\frac{95 \sqrt{a+a \mathrm{Cos}[c+d x]} \mathrm{Sin}[c+d x]}{48 a^3 d}$$

Result (type 3, 587 leaves):

$$-\frac{163\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+\frac{163\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}-\frac{40\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{c}{2}\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+$$

$$\frac{8\,\mathrm{Cos}\left[\frac{3\,d\,x}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{3\,c}{2}\right]}{3\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}-\frac{40\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+\frac{8\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{3\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}-\frac{29\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}-$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+\frac{29\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 140: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^3}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 145 leaves, 6 steps):

$$-\frac{75\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}+\frac{13\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{9\,\mathrm{Sin}[c+d\,x]}{4\,a^2\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 489 leaves):

$$\frac{75\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}-\frac{75\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+$$

$$\frac{16\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{c}{2}\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+\frac{16\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}-$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+\frac{21\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}-\frac{21\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 144: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Sec}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 144 leaves, 7 steps):

$$\frac{2\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}-\frac{43\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{11\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 1919 leaves) :

$$-\Bigg(\Bigg((2-2\,i)\,\left(1+e^{i\,c}\right)\,\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+$$
$$34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\Bigg)\Bigg/$$
$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\,\left(-1+e^{i\,c}\right)\,\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)\Bigg)-$$

$$\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}+$$

$$\frac{43\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}-$$

$$\frac{43\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}-$$

$$\frac{2\,\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}+$$

$$\left((1-i)\,\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right.$$
$$\left.\left((-1-i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right)\Bigg/\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left((1+i)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right.$$
$$\left.\left((-1-i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\right)\Bigg/\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\frac{16\, i\, \text{ArcTan}\left[\frac{2\, i\, \text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \text{Cot}\left[\frac{c}{2}\right]}{d\, (a\, (1+\text{Cos}[c+d x]))^{5/2} \sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}+\left(8 \sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \text{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left.\left(-d\, x\, \text{Cos}\left[\frac{c}{2}\right]+2\, \text{Log}\left[\sqrt{2}+2\, \text{Cos}\left[\frac{d x}{2}\right] \text{Sin}\left[\frac{c}{2}\right]+2\, \text{Cos}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]\right] \text{Sin}\left[\frac{c}{2}\right]+\frac{4\, i \sqrt{2}\, \text{ArcTan}\left[\frac{2\, i\, \text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] \text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right) \Big/$$

$$\left(d\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\left(4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2\right)\right)-\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{8\, d\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^4}-$$

$$\frac{11\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{8\, d\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{8\, d\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^4}+$$

$$\frac{11\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{8\, d\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}$$

- **Problem 145: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sec}[c+d x]^2}{(a+a\, \text{Cos}[c+d x])^{5/2}}\, dx$$

Optimal (type 3, 174 leaves, 8 steps):

$$-\frac{5\, \text{ArcTanh}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{a+a\, \text{Cos}[c+d x]}}\right]}{a^{5/2}\, d}+\frac{115\, \text{ArcTanh}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a\, \text{Cos}[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2}\, d}-$$

$$\frac{\text{Tan}[c+d x]}{4\, d\, (a+a\, \text{Cos}[c+d x])^{5/2}}-\frac{15\, \text{Tan}[c+d x]}{16\, a\, d\, (a+a\, \text{Cos}[c+d x])^{3/2}}+\frac{35\, \text{Tan}[c+d x]}{16\, a^2\, d \sqrt{a+a\, \text{Cos}[c+d x]}}$$

Result (type 3, 2051 leaves):

$$\Big((5-5\,i)\left(1+e^{i c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16\,i)\,e^{\frac{3 i c}{2}+i d x}+(20+20\,i)\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34\,i)\,e^{\frac{5 i c}{2}+2 i d x}-(20+20\,i)\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+$$

$$(16-16\,i)\,e^{\frac{7 i c}{2}+3 i d x}+(4+4\,i)\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8\,i\,e^{\frac{1}{2} i (c+d x)}-16\sqrt{2}\,e^{i (c+d x)}-40\,i\,e^{\frac{3}{2} i (c+d x)}+$$

$$34\sqrt{2}\,e^{2 i (c+d x)}+40\,i\,e^{\frac{5}{2} i (c+d x)}-16\sqrt{2}\,e^{3 i (c+d x)}-8\,i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4\,i)\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\Big)\Big/$$

$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4\,i\,e^{i (c+d x)}+2\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\right)^2 (a\,(1+\text{Cos}[c+d x]))^{5/2}\right)+$$

$$\frac{10\,i\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}}-$$

$$\frac{115\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{4\,d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}}+$$

$$\frac{115\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{4\,d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}}+$$

$$\frac{5\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}}-$$

$$\Big((5-5\,i)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)$$

$$\left((-1-i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\Big)\Big/\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\Big(\left(\frac{5}{2}+\frac{5\,i}{2}\right)\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)$$

$$\left((-1-i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\Big)\Big/\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\frac{40\,i\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Cot}\left[\frac{c}{2}\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}-\left(20\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+$$

$$\frac{19\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}-\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}-$$

$$\frac{19\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{4\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{4\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 146: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 111 leaves, 6 steps) :

$$\frac{6\,a\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{10\,a\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+$$

$$\frac{10\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 490 leaves) :

$$a\left(\sqrt{\cos[c+dx]}\,(1+\cos[c+dx])\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(-\frac{3\cot[c]}{5d}+\frac{23\cos[dx]\sin[c]}{84d}+\frac{\cos[2dx]\sin[2c]}{10d}+\frac{\cos[3dx]\sin[3c]}{28d}+\frac{23\cos[c]\sin[dx]}{84d}+\frac{\cos[2c]\sin[2dx]}{10d}+\frac{\cos[3c]\sin[3dx]}{28d}\right)-\frac{1}{21d\sqrt{1+\cot[c]^2}}5\,(1+\cos[c+dx])\csc[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\sin[dx-\text{ArcTan}[\cot[c]]]^2\right]\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^2\sec[dx-\text{ArcTan}[\cot[c]]]\sqrt{1-\sin[dx-\text{ArcTan}[\cot[c]]]}\sqrt{-\sqrt{1+\cot[c]^2}\sin[c]\sin[dx-\text{ArcTan}[\cot[c]]]}\sqrt{1+\sin[dx-\text{ArcTan}[\cot[c]]]}-\frac{1}{10d}3\,(1+\cos[c+dx])\csc[c]\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\cos[dx+\text{ArcTan}[\tan[c]]]^2\right]\sin[dx+\text{ArcTan}[\tan[c]]]\tan[c]\right)\Big/\left(\sqrt{1-\cos[dx+\text{ArcTan}[\tan[c]]]}\sqrt{1+\cos[dx+\text{ArcTan}[\tan[c]]]}\sqrt{\cos[c]\cos[dx+\text{ArcTan}[\tan[c]]]\sqrt{1+\tan[c]^2}}\sqrt{1+\tan[c]^2}\right)-\frac{\frac{\sin[dx+\text{ArcTan}[\tan[c]]]\tan[c]}{\sqrt{1+\tan[c]^2}}+\frac{2\cos[c]^2\cos[dx+\text{ArcTan}[\tan[c]]]\sqrt{1+\tan[c]^2}}{\cos[c]^2+\sin[c]^2}}{\sqrt{\cos[c]\cos[dx+\text{ArcTan}[\tan[c]]]\sqrt{1+\tan[c]^2}}}\right)\right)$$

- **Problem 147: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \cos[c+dx]^{3/2}\,(a+a\cos[c+dx])\,dx$$

Optimal (type 4, 87 leaves, 5 steps):

$$\frac{6a\,\text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]}{5d}+\frac{2a\,\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]}{3d}+\frac{2a\sqrt{\cos[c+dx]}\sin[c+dx]}{3d}+\frac{2a\cos[c+dx]^{3/2}\sin[c+dx]}{5d}$$

Result (type 5, 458 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(-\frac{3\,\text{Cot}[c]}{5\,d}+\frac{\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{10\,d}+\frac{\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{10\,d}\right)-\right.$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{10\,d}3\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 148: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 61 leaves, 4 steps) :

$$\frac{2\,a\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{d}+\frac{2\,a\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,d}+\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 424 leaves) :

$$a \left( \sqrt{\mathrm{Cos}[c+d\,x]}\ (1+\mathrm{Cos}[c+d\,x])\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \left( -\frac{\mathrm{Cot}[c]}{d} + \frac{\mathrm{Cos}[d\,x]\ \mathrm{Sin}[c]}{3\,d} + \frac{\mathrm{Cos}[c]\ \mathrm{Sin}[d\,x]}{3\,d} \right) - \frac{1}{3\,d\,\sqrt{1+\mathrm{Cot}[c]^2}} \right.$$

$$(1+\mathrm{Cos}[c+d\,x])\ \mathrm{Csc}[c]\ \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\ \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\ \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\ \mathrm{Sin}[c]\ \mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\ \sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} - \frac{1}{2\,d}(1+\mathrm{Cos}[c+d\,x])$$

$$\mathrm{Csc}[c]\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \left( \left( \mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\ \mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\ \mathrm{Tan}[c] \right) \Big/ \right.$$

$$\left( \sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\ \sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\ \sqrt{\mathrm{Cos}[c]\ \mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\ \sqrt{1+\mathrm{Tan}[c]^2}}\ \sqrt{1+\mathrm{Tan}[c]^2} \right) -$$

$$\left. \left. \frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\ \mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}} + \frac{2\,\mathrm{Cos}[c]^2\ \mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\ \sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\ \mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\ \sqrt{1+\mathrm{Tan}[c]^2}}} \right) \right)$$

- **Problem 149: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{a+a\,\mathrm{Cos}[c+d\,x]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 35 leaves, 3 steps) :

$$\frac{2\,a\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{d} + \frac{2\,a\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{d}$$

Result (type 5, 155 leaves) :

$$\frac{1}{2\,d} a \sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\left(-2\sqrt{\text{Cos}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2}\,\sqrt{\text{Csc}[c]^2}\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\text{Sin}[c]+\text{Tan}[d\,x+\text{ArcTan}[\text{Tan}[c]]]-\frac{\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Tan}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}{\sqrt{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2}}\right)$$

- **Problem 150: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{a+a\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 57 leaves, 4 steps):

$$-\frac{2\,a\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{d}+\frac{2\,a\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{d}+\frac{2\,a\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 413 leaves):

$$
\begin{aligned}
&a\left(\sqrt{\text{Cos}[c+d\,x]}\;(1+\text{Cos}[c+d\,x])\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(\frac{\text{Csc}[c]\;\text{Sec}[c]}{d}+\frac{\text{Sec}[c]\;\text{Sec}[c+d\,x]\;\text{Sin}[d\,x]}{d}\right)-\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}\right.\\
&\quad(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\;\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\\
&\quad\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\;\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2\,d}(1+\text{Cos}[c+d\,x])\\
&\quad\text{Csc}[c]\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\;\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]\right)\Big/\right.\\
&\quad\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-\\
&\quad\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)\right)
\end{aligned}
$$

- **Problem 151: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{a+a\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 83 leaves, 5 steps) :

$$-\frac{2\,a\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{d}+\frac{2\,a\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,d}+\frac{2\,a\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 444 leaves) :

$$a\left(\sqrt{\mathrm{Cos}[c+d\,x]}\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(\frac{\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(\mathrm{Sin}[c]+3\,\mathrm{Sin}[d\,x])}{3\,d}\right)-\right.$$

$$\frac{1}{3\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}+\frac{1}{2\,d}(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)\right)$$

- **Problem 152: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{a+a\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 111 leaves, 6 steps):

$$-\frac{6\,a\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{5\,d}+\frac{2\,a\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,d}+\frac{2\,a\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{2\,a\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{6\,a\,\mathrm{Sin}[c+d\,x]}{5\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}$$

Result (type 5, 477 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(\frac{3\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{5\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,\text{Sin}[c]+5\,\text{Sin}[d\,x])}{15\,d}+\right.\right.$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(5\,\text{Sin}[c]+9\,\text{Sin}[d\,x])}{15\,d}\right)-\frac{1}{3\,d\sqrt{1+\text{Cot}[c]^2}}(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]$$

$$\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{10\,d}3\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 153: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^2\,dx$$

Optimal (type 4, 147 leaves, 10 steps):

$$\frac{32\,a^2\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{15\,d}+\frac{20\,a^2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{21\,d}+\frac{20\,a^2\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+$$

$$\frac{32\,a^2\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{4\,a^2\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,a^2\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 532 leaves):

$$\sqrt{\text{Cos}[c+d x]}\;(a+a\,\text{Cos}[c+d x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-\frac{8\,\text{Cot}[c]}{15\,d}+\frac{23\,\text{Cos}[d x]\,\text{Sin}[c]}{84\,d}+\frac{37\,\text{Cos}[2 d x]\,\text{Sin}[2 c]}{360\,d}+\frac{\text{Cos}[3 d x]\,\text{Sin}[3 c]}{28\,d}+\right.$$

$$\left.\frac{\text{Cos}[4 d x]\,\text{Sin}[4 c]}{144\,d}+\frac{23\,\text{Cos}[c]\,\text{Sin}[d x]}{84\,d}+\frac{37\,\text{Cos}[2 c]\,\text{Sin}[2 d x]}{360\,d}+\frac{\text{Cos}[3 c]\,\text{Sin}[3 d x]}{28\,d}+\frac{\text{Cos}[4 c]\,\text{Sin}[4 d x]}{144\,d}\right)-$$

$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{15\,d}4\,(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 154: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^2\,dx$$

Optimal (type 4, 121 leaves, 9 steps):

$$\frac{12\,a^2\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{5\,d}+\frac{8\,a^2\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{7\,d}+$$

$$\frac{8\,a^2\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{7\,d}+\frac{4\,a^2\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{5\,d}+\frac{2\,a^2\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{7\,d}$$

Result (type 5, 500 leaves):

$$\sqrt{\operatorname{Cos}[c+d x]}\,(a+a\operatorname{Cos}[c+d x])^2\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-\frac{3\operatorname{Cot}[c]}{5 d}+\frac{17\operatorname{Cos}[d x]\operatorname{Sin}[c]}{56 d}+\frac{\operatorname{Cos}[2 d x]\operatorname{Sin}[2 c]}{10 d}+\frac{\operatorname{Cos}[3 d x]\operatorname{Sin}[3 c]}{56 d}+\frac{17\operatorname{Cos}[c]\operatorname{Sin}[d x]}{56 d}+\frac{\operatorname{Cos}[2 c]\operatorname{Sin}[2 d x]}{10 d}+\frac{\operatorname{Cos}[3 c]\operatorname{Sin}[3 d x]}{56 d}\right)-$$

$$\frac{1}{7 d\sqrt{1+\operatorname{Cot}[c]^2}}2\,(a+a\operatorname{Cos}[c+d x])^2\operatorname{Csc}[c]\operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\sqrt{-\sqrt{1+\operatorname{Cot}[c]^2}\operatorname{Sin}[c]\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}-\frac{1}{10 d}3\,(a+a\operatorname{Cos}[c+d x])^2\operatorname{Csc}[c]\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\operatorname{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\operatorname{Cos}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]^2\right]\operatorname{Sin}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]\operatorname{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\operatorname{Cos}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]}\sqrt{1+\operatorname{Cos}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]}\sqrt{\operatorname{Cos}[c]\operatorname{Cos}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]\sqrt{1+\operatorname{Tan}[c]^2}}\sqrt{1+\operatorname{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\operatorname{Sin}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]\operatorname{Tan}[c]}{\sqrt{1+\operatorname{Tan}[c]^2}}+\frac{2\operatorname{Cos}[c]^2\operatorname{Cos}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]\sqrt{1+\operatorname{Tan}[c]^2}}{\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2}}{\sqrt{\operatorname{Cos}[c]\operatorname{Cos}[d x+\operatorname{ArcTan}[\operatorname{Tan}[c]]]\sqrt{1+\operatorname{Tan}[c]^2}}}\right)$$

- **Problem 155: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\operatorname{Cos}[c+d x]}\,(a+a\operatorname{Cos}[c+d x])^2\,dx$$

Optimal (type 4, 95 leaves, 7 steps):

$$\frac{16 a^2\operatorname{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{5 d}+\frac{4 a^2\operatorname{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 d}+\frac{4 a^2\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Sin}[c+d x]}{3 d}+\frac{2 a^2\operatorname{Cos}[c+d x]^{3/2}\operatorname{Sin}[c+d x]}{5 d}$$

Result (type 5, 468 leaves):

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-\frac{4\,\text{Cot}[c]}{5 d}+\frac{\text{Cos}[d x]\,\text{Sin}[c]}{3 d}+\frac{\text{Cos}[2 d x]\,\text{Sin}[2 c]}{20 d}+\frac{\text{Cos}[c]\,\text{Sin}[d x]}{3 d}+\frac{\text{Cos}[2 c]\,\text{Sin}[2 d x]}{20 d}\right)-$$

$$\frac{1}{3 d\sqrt{1+\text{Cot}[c]^2}}(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\ -\frac{1}{5 d}2\,(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 156: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d x])^2}{\sqrt{\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 67 leaves, 6 steps):

$$\frac{4 a^2\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{d}+\frac{8 a^2\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 d}+\frac{2 a^2\sqrt{\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{3 d}$$

Result (type 5, 434 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(-\frac{\text{Cot}[c]}{d}+\frac{\text{Cos}[d\,x]\,\text{Sin}[c]}{6\,d}+\frac{\text{Cos}[c]\,\text{Sin}[d\,x]}{6\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$2\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d}(a+a\,\text{Cos}[c+d\,x])^2$$

$$\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 158: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 91 leaves, 7 steps):

$$-\frac{4\,a^2\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{d}+\frac{8\,a^2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,d}+\frac{2\,a^2\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^2\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 454 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(\frac{\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{6\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(\text{Sin}[c]+6\,\text{Sin}[d\,x])}{6\,d}\right)-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}2\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2\,d}(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 159: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 121 leaves, 9 steps) :

$$-\frac{16\,a^2\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^2\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}+\frac{2\,a^2\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{4\,a^2\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{16\,a^2\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 487 leaves) :

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(\frac{4\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{10\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,\text{Sin}[c]+10\,\text{Sin}[d\,x])}{30\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(5\,\text{Sin}[c]+12\,\text{Sin}[d\,x])}{15\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{5\,d}2\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 160: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3\,dx$$

Optimal (type 4, 147 leaves, 12 steps):

$$\frac{68\,a^3\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{44\,a^3\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{44\,a^3\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{68\,a^3\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{6\,a^3\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,a^3\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 532 leaves):

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\left(-\frac{17\,\text{Cot}[c]}{30\,d}+\frac{97\,\text{Cos}[d x]\,\text{Sin}[c]}{336\,d}+\frac{73\,\text{Cos}[2 d x]\,\text{Sin}[2 c]}{720\,d}+\frac{3\,\text{Cos}[3 d x]\,\text{Sin}[3 c]}{112\,d}+\frac{\text{Cos}[4 d x]\,\text{Sin}[4 c]}{288\,d}+\frac{97\,\text{Cos}[c]\,\text{Sin}[d x]}{336\,d}+\frac{73\,\text{Cos}[2 c]\,\text{Sin}[2 d x]}{720\,d}+\frac{3\,\text{Cos}[3 c]\,\text{Sin}[3 d x]}{112\,d}+\frac{\text{Cos}[4 c]\,\text{Sin}[4 d x]}{288\,d}\right)-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}11\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{60\,d}17\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 161: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^3\,dx$$

Optimal (type 4, 121 leaves, 10 steps):

$$\frac{28\,a^3\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{5\,d}+\frac{52\,a^3\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{21\,d}+\frac{52\,a^3\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{21\,d}+\frac{6\,a^3\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{5\,d}+\frac{2\,a^3\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{7\,d}$$

Result (type 5, 500 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{7\,\text{Cot}[c]}{10\,d}+\frac{107\,\text{Cos}[d\,x]\,\text{Sin}[c]}{336\,d}+\frac{3\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{40\,d}+\frac{\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{112\,d}+\frac{107\,\text{Cos}[c]\,\text{Sin}[d\,x]}{336\,d}+\frac{3\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{40\,d}+\frac{\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{112\,d}\right)-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}13\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20\,d}7\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 162: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 91 leaves, 8 steps):

$$\frac{36\,a^3\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{d}+\frac{2\,a^3\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}+\frac{2\,a^3\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 468 leaves):

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\left(-\frac{9\,\text{Cot}[c]}{10\,d}+\frac{\text{Cos}[d x]\,\text{Sin}[c]}{4\,d}+\frac{\text{Cos}[2 d x]\,\text{Sin}[2 c]}{40\,d}+\frac{\text{Cos}[c]\,\text{Sin}[d x]}{4\,d}+\frac{\text{Cos}[2 c]\,\text{Sin}[2 d x]}{40\,d}\right)-$$

$$\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20\,d}9\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 163: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d x])^3}{\text{Cos}[c+d x]^{3/2}}\,dx$$

Optimal (type 4, 91 leaves, 8 steps) :

$$\frac{4\,a^3\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{d}+\frac{20\,a^3\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3\,d}+\frac{2\,a^3\,\text{Sin}[c+d x]}{d\,\sqrt{\text{Cos}[c+d x]}}+\frac{2\,a^3\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3\,d}$$

Result (type 5, 465 leaves) :

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$
$$\left(-\frac{(1+3\,\text{Cos}[2 c])\,\text{Csc}[c]\,\text{Sec}[c]}{8 d}+\frac{\text{Cos}[d x]\,\text{Sin}[c]}{12 d}+\frac{\text{Cos}[c]\,\text{Sin}[d x]}{12 d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d x]\,\text{Sin}[d x]}{4 d}\right)-\frac{1}{6 d\sqrt{1+\text{Cot}[c]^2}}$$
$$5\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{4 d}(a+a\,\text{Cos}[c+d x])^3$$
$$\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 164: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d x])^3}{\text{Cos}[c+d x]^{5/2}}\,dx$$

Optimal (type 4, 91 leaves, 8 steps):

$$-\frac{4 a^3\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{d}+\frac{20 a^3\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 d}+\frac{2 a^3\,\text{Sin}[c+d x]}{3 d\,\text{Cos}[c+d x]^{3/2}}+\frac{6 a^3\,\text{Sin}[c+d x]}{d\sqrt{\text{Cos}[c+d x]}}$$

Result (type 5, 463 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(-\frac{(-5+\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{8\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{12\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(\text{Sin}[c]+9\,\text{Sin}[d\,x])}{12\,d}\right)-\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$5\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{4\,d}(a+a\,\text{Cos}[c+d\,x])^3$$

$$\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 165: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 117 leaves, 10 steps):

$$-\frac{36\,a^3\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{d}+\frac{2\,a^3\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,a^3\,\text{Sin}[c+d\,x]}{d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{36\,a^3\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 485 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\frac{9\,\text{Csc}[c]\,\text{Sec}[c]}{10\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{20\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(\text{Sin}[c]+5\,\text{Sin}[d\,x])}{20\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(5\,\text{Sin}[c]+18\,\text{Sin}[d\,x])}{20\,d}\right)-$$

$$\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{20\,d}9\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 166: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 147 leaves, 12 steps):

$$-\frac{28\,a^3\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{52\,a^3\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+$$

$$\frac{2\,a^3\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{6\,a^3\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{52\,a^3\,\text{Sin}[c+d\,x]}{21\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{28\,a^3\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 515 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\frac{7\,\text{Csc}[c]\,\text{Sec}[c]}{10\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{28\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(5\,\text{Sin}[c]+21\,\text{Sin}[d\,x])}{140\,d}+\right.$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(63\,\text{Sin}[c]+130\,\text{Sin}[d\,x])}{420\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(65\,\text{Sin}[c]+147\,\text{Sin}[d\,x])}{210\,d}\right)-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$13\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{20\,d}7\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 167: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^4\,dx$$

Optimal (type 4, 173 leaves, 16 steps):

$$\frac{128\,a^4\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{904\,a^4\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{231\,d}+\frac{904\,a^4\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{231\,d}+$$

$$\frac{128\,a^4\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{150\,a^4\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{77\,d}+\frac{8\,a^4\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}+\frac{2\,a^4\,\text{Cos}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{11\,d}$$

Result (type 5, 564 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\left(-\frac{8\,\text{Cot}[c]}{15\,d}+\frac{4087\,\text{Cos}[d\,x]\,\text{Sin}[c]}{14\,784\,d}+\frac{37\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{360\,d}+\frac{321\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{9856\,d}+\frac{\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{144\,d}+\frac{\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{1408\,d}+\frac{4087\,\text{Cos}[c]\,\text{Sin}[d\,x]}{14\,784\,d}+\frac{37\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{360\,d}+\frac{321\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{9856\,d}+\frac{\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{144\,d}+\frac{\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{1408\,d}\right)-$$

$$\frac{1}{462\,d\,\sqrt{1+\text{Cot}[c]^2}}113\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{15\,d}4\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

■ **Problem 168: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^4\,dx$$

Optimal (type 4, 147 leaves, 13 steps):

$$\frac{152\,a^4\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{32\,a^4\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{7\,d}+\frac{32\,a^4\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{122\,a^4\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{8\,a^4\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,a^4\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 532 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\left(-\frac{19\,\text{Cot}[c]}{30\,d}+\frac{17\,\text{Cos}[d\,x]\,\text{Sin}[c]}{56\,d}+\frac{127\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{1440\,d}+\frac{\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{56\,d}+\right.$$

$$\left.\frac{\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{576\,d}+\frac{17\,\text{Cos}[c]\,\text{Sin}[d\,x]}{56\,d}+\frac{127\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{1440\,d}+\frac{\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{56\,d}+\frac{\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{576\,d}\right)-$$

$$\frac{1}{7\,d\,\sqrt{1+\text{Cot}[c]^2}}2\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{60\,d}19\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 169: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^4}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 121 leaves, 11 steps):

$$\frac{64\,a^4\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{136\,a^4\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+$$

$$\frac{94\,a^4\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{8\,a^4\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a^4\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 500 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\left(-\frac{4\,\text{Cot}[c]}{5\,d}+\frac{191\,\text{Cos}[d\,x]\,\text{Sin}[c]}{672\,d}+\frac{\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{20\,d}+\frac{\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{224\,d}+\frac{191\,\text{Cos}[c]\,\text{Sin}[d\,x]}{672\,d}+\frac{\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{20\,d}+\frac{\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{224\,d}\right)-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}17\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{5\,d}2\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 170: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^4}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 119 leaves, 10 steps):

$$\frac{56\,a^4\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{5\,d}+\frac{32\,a^4\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,d}+\frac{2\,a^4\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{8\,a^4\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,a^4\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 497 leaves):

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8\left(-\frac{(23+33\,\text{Cos}[2 c])\,\text{Csc}[c]\,\text{Sec}[c]}{80 d}+\frac{\text{Cos}[d x]\,\text{Sin}[c]}{6 d}+\frac{\text{Cos}[2 d x]\,\text{Sin}[2 c]}{80 d}+\frac{\text{Cos}[c]\,\text{Sin}[d x]}{6 d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d x]\,\text{Sin}[d x]}{8 d}+\frac{\text{Cos}[2 c]\,\text{Sin}[2 d x]}{80 d}\right)-$$

$$\frac{1}{3 d\sqrt{1+\text{Cot}[c]^2}}2\,(a+a\,\text{Cos}[c+d x])^4\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20 d}7\,(a+a\,\text{Cos}[c+d x])^4\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 172: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d x])^4}{\text{Cos}[c+d x]^{7/2}}\,dx$$

Optimal (type 4, 121 leaves, 11 steps):

$$-\frac{56 a^4\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{5 d}+\frac{32 a^4\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 d}+\frac{2 a^4\,\text{Sin}[c+d x]}{5 d\,\text{Cos}[c+d x]^{5/2}}+\frac{8 a^4\,\text{Sin}[c+d x]}{3 d\,\text{Cos}[c+d x]^{3/2}}+\frac{66 a^4\,\text{Sin}[c+d x]}{5 d\sqrt{\text{Cos}[c+d x]}}$$

Result (type 5, 495 leaves):

$$\sqrt{\cos[c+d\,x]}\;(a+a\cos[c+d\,x])^4\,\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\left(-\frac{(-61+5\cos[2\,c])\csc[c]\sec[c]}{80\,d}+\frac{\sec[c]\sec[c+d\,x]^3\sin[d\,x]}{40\,d}+\frac{\sec[c]\sec[c+d\,x]^2\,(3\sin[c]+20\sin[d\,x])}{120\,d}+\frac{\sec[c]\sec[c+d\,x]\,(20\sin[c]+99\sin[d\,x])}{120\,d}\right)-$$

$$\frac{1}{3\,d\sqrt{1+\cot[c]^2}}2\,(a+a\cos[c+d\,x])^4\csc[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\sin[d\,x-\text{ArcTan}[\cot[c]]]^2\right]\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\sec[d\,x-\text{ArcTan}[\cot[c]]]\sqrt{1-\sin[d\,x-\text{ArcTan}[\cot[c]]]}\sqrt{-\sqrt{1+\cot[c]^2}\,\sin[c]\sin[d\,x-\text{ArcTan}[\cot[c]]]}$$

$$\sqrt{1+\sin[d\,x-\text{ArcTan}[\cot[c]]]}+\frac{1}{20\,d}7\,(a+a\cos[c+d\,x])^4\csc[c]\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\cos[d\,x+\text{ArcTan}[\tan[c]]]^2\right]\sin[d\,x+\text{ArcTan}[\tan[c]]]\tan[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\cos[d\,x+\text{ArcTan}[\tan[c]]]}\sqrt{1+\cos[d\,x+\text{ArcTan}[\tan[c]]]}\sqrt{\cos[c]\cos[d\,x+\text{ArcTan}[\tan[c]]]\sqrt{1+\tan[c]^2}}\sqrt{1+\tan[c]^2}\right)-$$

$$\left.\frac{\frac{\sin[d\,x+\text{ArcTan}[\tan[c]]]\tan[c]}{\sqrt{1+\tan[c]^2}}+\frac{2\cos[c]^2\cos[d\,x+\text{ArcTan}[\tan[c]]]\sqrt{1+\tan[c]^2}}{\cos[c]^2+\sin[c]^2}}{\sqrt{\cos[c]\cos[d\,x+\text{ArcTan}[\tan[c]]]\sqrt{1+\tan[c]^2}}}\right)$$

- **Problem 173: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\cos[c+d\,x])^4}{\cos[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 147 leaves, 13 steps):

$$-\frac{64\,a^4\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{5\,d}+\frac{136\,a^4\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{21\,d}+\frac{2\,a^4\sin[c+d\,x]}{7\,d\cos[c+d\,x]^{7/2}}+\frac{8\,a^4\sin[c+d\,x]}{5\,d\cos[c+d\,x]^{5/2}}+\frac{94\,a^4\sin[c+d\,x]}{21\,d\cos[c+d\,x]^{3/2}}+\frac{64\,a^4\sin[c+d\,x]}{5\,d\sqrt{\cos[c+d\,x]}}$$

Result (type 5, 515 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\left(\frac{4\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{56\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(5\,\text{Sin}[c]+28\,\text{Sin}[d\,x])}{280\,d}+\right.$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(84\,\text{Sin}[c]+235\,\text{Sin}[d\,x])}{840\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(235\,\text{Sin}[c]+672\,\text{Sin}[d\,x])}{840\,d}\right)-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$17\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{5\,d}2\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 174: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{7/2}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 128 leaves, 6 steps) :

$$\frac{21\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a\,d}-\frac{5\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}-$$

$$\frac{5\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d}+\frac{7\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}-\frac{\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 315 leaves) :

$$\frac{1}{15\,a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\left(\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(63\left(1+e^{2\,i\,(c+d\,x)}\right)+63\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+25\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-\frac{1}{d}2\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c]\left(15+10\,\text{Cos}[d\,x]\,\text{Sin}[c]^2-6\,\text{Cos}[c]\left(-8+\text{Cos}[2\,d\,x]\,\text{Sin}[c]^2\right)+30\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+5\,\text{Sin}[2\,c]\,\text{Sin}[d\,x]-3\,\text{Cos}[2\,c]\,\text{Sin}[c]\,\text{Sin}[2\,d\,x]\right)\right)$$

- **Problem 175: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 100 leaves, 5 steps):

$$-\frac{3\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a\,d}+\frac{5\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a\,d}+\frac{5\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d}-\frac{\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 289 leaves):

$$\frac{1}{3\,a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\left(-\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(9\left(1+e^{2\,i\,(c+d\,x)}\right)+9\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)+1/d2\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c]\left(3+6\,\text{Cos}[c]+2\,\text{Cos}[d\,x]\,\text{Sin}[c]^2+6\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+\text{Sin}[2\,c]\,\text{Sin}[d\,x]\right)\right)$$

- **Problem 176: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 72 leaves, 4 steps):

$$\frac{3\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a\,d}-\frac{\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{a\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 264 leaves):

$$\frac{1}{a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(3\,\left(1+e^{2\,i\,(c+d\,x)}\right)+3\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+e^{i\,(c+d\,x)}\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,\left(2\,\text{Cot}[c]+\text{Csc}[c]+\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}\right)$$

- **Problem 177: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 70 leaves, 4 steps):

$$-\frac{\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 256 leaves):

$$\frac{1}{a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(-\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+e^{i\,(c+d\,x)}\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)+\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,\left(\text{Csc}[c]+\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}\right)$$

- **Problem 178: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 70 leaves, 4 steps):

$$\frac{\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 257 leaves):

$$\frac{1}{a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\,\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,\left(\text{Csc}[c]+\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}\right)$$

- **Problem 179: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 96 leaves, 5 steps):

$$-\frac{3\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}-\frac{\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{3\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 297 leaves):

$$\frac{1}{a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(-\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(3\,\left(1+e^{2\,i\,(c+d\,x)}\right)+3\,\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\,\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)+\frac{\left(2\,\text{Cos}\left[\frac{1}{2}\,(c-d\,x)\right]+\text{Cos}\left[\frac{1}{2}\,(3\,c+d\,x)\right]+3\,\text{Cos}\left[\frac{1}{2}\,(c+3\,d\,x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\,d\,\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 180: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 124 leaves, 6 steps):

$$\frac{3\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{5\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+\frac{5\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}-\frac{3\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{\text{Sin}[c+d\,x]}{d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 332 leaves):

$$\frac{1}{3\,a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\left(\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(9\left(1+e^{2\,i\,(c+d\,x)}\right)+9\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-1\Big/\left(4\,d\,\text{Cos}[c+d\,x]^{3/2}\right)\left(10\,\text{Cos}\left[\frac{1}{2}(c-d\,x)\right]+8\,\text{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]+4\,\text{Cos}\left[\frac{1}{2}(c+3\,d\,x)\right]+5\,\text{Cos}\left[\frac{1}{2}(5\,c+3\,d\,x)\right]+9\,\text{Cos}\left[\frac{1}{2}(3\,c+5\,d\,x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 181: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{9/2}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 160 leaves, 7 steps):

$$\frac{56\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{5\,a^2\,d}-\frac{5\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}-\frac{5\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a^2\,d}+\frac{56\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a^2\,d}-\frac{3\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 367 leaves):

$$\frac{1}{5\,a^2\,(1+\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\left(\left(4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(56\left(1+e^{2\,i\,(c+d\,x)}\right)+56\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+25\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-\frac{1}{3\,d}2\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c]\left(120+40\,\text{Cos}[d\,x]\,\text{Sin}[c]^2-6\,\text{Cos}[2\,d\,x]\,\text{Sin}[c]\,\text{Sin}[2\,c]+240\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]-10\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Sin}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+8\,\text{Cos}[c]\,(27+5\,\text{Sin}[c]\,\text{Sin}[d\,x])-6\,\text{Cos}[2\,c]\,\text{Sin}[c]\,\text{Sin}[2\,d\,x]-5\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sin}[c]\,\text{Tan}\left[\frac{c}{2}\right]\right)\right)$$

- **Problem 182: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{7/2}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 138 leaves, 6 steps):

$$-\frac{7\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}+\frac{10\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 a^2 d}+\frac{10\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3 a^2 d}-\frac{7\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3 a^2 d\,(1+\text{Cos}[c+d x])}-\frac{\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{3 d\,(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 337 leaves):

$$\frac{1}{3 a^2 (1+\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^4\left(-\left(4\,i\sqrt{2}\,e^{-i(c+d x)}\left(21\left(1+e^{2 i (c+d x)}\right)+21\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i (c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+10\,e^{i (c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i (c+d x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2 i c}\right)\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\right)+1\Big/\left(2 d\right)\sqrt{\text{Cos}[c+d x]}\left(72\,\text{Cos}\left[\frac{1}{2}(c-d x)\right]+54\,\text{Cos}\left[\frac{1}{2}(3 c+d x)\right]+33\,\text{Cos}\left[\frac{1}{2}(c+3 d x)\right]+9\,\text{Cos}\left[\frac{1}{2}(5 c+3 d x)\right]+\text{Cos}\left[\frac{1}{2}(3 c+5 d x)\right]-\text{Cos}\left[\frac{1}{2}(7 c+5 d x)\right]\right)\text{Csc}[c]\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3\right)$$

- **Problem 183: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{5/2}}{(a+a\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 112 leaves, 5 steps):

$$\frac{4\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}-\frac{5\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 a^2 d}-\frac{5\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3 a^2 d\,(1+\text{Cos}[c+d x])}-\frac{\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3 d\,(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 319 leaves):

$$\frac{1}{3 a^2 (1+\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^4\left(\left(4\,i\sqrt{2}\,e^{-i(c+d x)}\left(12\left(1+e^{2 i (c+d x)}\right)+12\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i (c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+5\,e^{i (c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i (c+d x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2 i c}\right)\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\right)-1\Big/\left(2 d\right)\sqrt{\text{Cos}[c+d x]}\left(20\,\text{Cos}\left[\frac{1}{2}(c-d x)\right]+16\,\text{Cos}\left[\frac{1}{2}(3 c+d x)\right]+9\,\text{Cos}\left[\frac{1}{2}(c+3 d x)\right]+3\,\text{Cos}\left[\frac{1}{2}(5 c+3 d x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3\right)$$

- **Problem 184: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 109 leaves, 5 steps):

$$-\frac{\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}+\frac{2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a^2\,d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 640 leaves):

$$-\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}\,i\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)-$$
$$\left(4\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\sqrt{\text{Cos}[c+d\,x]}$$
$$\left(\frac{4\,\text{Csc}[c]}{d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 186: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 109 leaves, 5 steps):

$$\frac{\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}+\frac{2\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 a^2 d}-\frac{\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{a^2 d\,(1+\text{Cos}[c+d x])}-\frac{\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3 d\,(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 304 leaves) :

$$\frac{1}{3 a^2 (1+\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^4\Bigg(\Bigg(4 i\sqrt{2}\,e^{-i(c+d x)}\Bigg(3\left(1+e^{2 i(c+d x)}\right)+3\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i(c+d x)}\right]-$$
$$2 e^{i(c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i(c+d x)}\right]\Bigg)\Bigg)\Bigg/\left(d\left(-1+e^{2 i c}\right)\sqrt{e^{-i(c+d x)}\left(1+e^{2 i(c+d x)}\right)}\right)-$$
$$1/(2 d)\sqrt{\text{Cos}[c+d x]}\left(7\,\text{Cos}\left[\frac{1}{2}(c-d x)\right]+2\,\text{Cos}\left[\frac{1}{2}(3 c+d x)\right]+3\,\text{Cos}\left[\frac{1}{2}(c+3 d x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3\Bigg)$$

- **Problem 187: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 136 leaves, 6 steps) :

$$-\frac{4\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}-\frac{5\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 a^2 d}+$$
$$\frac{4\,\text{Sin}[c+d x]}{a^2 d\sqrt{\text{Cos}[c+d x]}}-\frac{5\,\text{Sin}[c+d x]}{3 a^2 d\sqrt{\text{Cos}[c+d x]}\,(1+\text{Cos}[c+d x])}-\frac{\text{Sin}[c+d x]}{3 d\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 334 leaves) :

$$\frac{1}{3 a^2 (1+\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^4\Bigg(-\Bigg(4 i\sqrt{2}\,e^{-i(c+d x)}\Bigg(12\left(1+e^{2 i(c+d x)}\right)+12\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i(c+d x)}\right]-$$
$$5 e^{i(c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i(c+d x)}\right]\Bigg)\Bigg)\Bigg/\left(d\left(-1+e^{2 i c}\right)\sqrt{e^{-i(c+d x)}\left(1+e^{2 i(c+d x)}\right)}\right)+$$
$$1\Big/\left(4 d\sqrt{\text{Cos}[c+d x]}\right)\left(29\,\text{Cos}\left[\frac{1}{2}(c-d x)\right]+19\,\text{Cos}\left[\frac{1}{2}(3 c+d x)\right]+31\,\text{Cos}\left[\frac{1}{2}(c+3 d x)\right]+5\,\text{Cos}\left[\frac{1}{2}(5 c+3 d x)\right]+12\,\text{Cos}\left[\frac{1}{2}(3 c+5 d x)\right]\right)$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3\Bigg)$$

- **Problem 188: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 162 leaves, 7 steps):

$$\frac{7\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}+\frac{10\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a^2\,d}+\frac{10\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}-\frac{7\,\text{Sin}[c+d\,x]}{a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{7\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}\,(1+\text{Cos}[c+d\,x])}-\frac{\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 425 leaves):

$$\left(4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(21\left(1+e^{2\,i\,(c+d\,x)}\right)+21\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-10\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(3\,d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\,(a+a\,\text{Cos}[c+d\,x])^2\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}\left(-\frac{2\,(4+3\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]}{d}-\frac{12\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\frac{8\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(\text{Sin}[c]-6\,\text{Sin}[d\,x])}{3\,d}+\frac{8\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 189: Result unnecessarily involves higher level functions.**

$$\int\frac{\text{Cos}[c+d\,x]^{11/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 207 leaves, 8 steps):

$$\frac{231\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}-\frac{21\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{2\,a^3\,d}-\frac{21\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a^3\,d}+\frac{77\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{10\,a^3\,d}-\frac{\text{Cos}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{4\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{5\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{63\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{10\,d\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 388 leaves):

$$\frac{1}{5\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}2\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^6\left(\left(42\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(11\left(1+e^{2\,i\,(c+d\,x)}\right)+11\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-\sqrt{\text{Cos}[c+d\,x]}\left(264\,\text{Cot}[c]+198\,\text{Csc}[c]+\frac{1}{16}\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\left(1210\,\text{Sin}\left[\frac{d\,x}{2}\right]-770\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+840\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-150\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+238\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+40\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+5\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+5\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)\right)\right)$$

- **Problem 190: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{9/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 181 leaves, 7 steps):

$$-\frac{119\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}+\frac{11\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{2\,a^3\,d}+\frac{11\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a^3\,d}-\frac{\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{3\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{119\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{30\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 369 leaves):

$$\frac{1}{5\,a^3\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^6\left(-\left(4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(119\left(1+e^{2\,i\,(c+d\,x)}\right)+119\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+55\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)+\frac{1}{12\,d}\sqrt{\text{Cos}[c+d\,x]}\left(1961\,\text{Cos}\left[\frac{1}{2}(c-d\,x)\right]+1609\,\text{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]+1165\,\text{Cos}\left[\frac{1}{2}(c+3\,d\,x)\right]+620\,\text{Cos}\left[\frac{1}{2}(5\,c+3\,d\,x)\right]+292\,\text{Cos}\left[\frac{1}{2}(3\,c+5\,d\,x)\right]+65\,\text{Cos}\left[\frac{1}{2}(7\,c+5\,d\,x)\right]+5\,\text{Cos}\left[\frac{1}{2}(5\,c+7\,d\,x)\right]-5\,\text{Cos}\left[\frac{1}{2}(9\,c+7\,d\,x)\right]\right)\text{Csc}[c]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\right)$$

- **Problem 191: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{7/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 155 leaves, 6 steps):

$$\frac{49\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}-\frac{13\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{6\,a^3\,d}-$$
$$\frac{\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{8\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{13\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 435 leaves) :

$$\left(4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(147\left(1+e^{2\,i\,(c+d\,x)}\right)+147\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+\right.\right.$$
$$\left.\left.65\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/$$
$$\left(15\,d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\,(a+a\,\text{Cos}[c+d\,x])^3\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\left(-\frac{4\,(29+20\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}-\frac{116\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}+\right.$$
$$\left.\frac{56\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{15\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}+\frac{56\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 192: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 155 leaves, 6 steps) :

$$-\frac{9\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}+\frac{\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{2\,a^3\,d}-$$
$$\frac{\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{9\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 705 leaves) :

$$-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-$$

$$\left(2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\,\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{36\,\text{Csc}[c]}{5\,d}+\frac{36\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}-\frac{12\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}+\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}-\frac{12\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 193: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 155 leaves, 6 steps):

$$-\frac{\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{4\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 334 leaves):

$$\frac{1}{15\,a^3\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^6\left(-\left(4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(3\left(1+e^{2\,i\,(c+d\,x)}\right)+3\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)+1\Big/\left(8\,d\right)\sqrt{\text{Cos}[c+d\,x]}\left(14\,\text{Cos}\left[\frac{1}{2}(c-d\,x)\right]+16\,\text{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]+20\,\text{Cos}\left[\frac{1}{2}(c+3\,d\,x)\right]-5\,\text{Cos}\left[\frac{1}{2}(5\,c+3\,d\,x)\right]+3\,\text{Cos}\left[\frac{1}{2}(3\,c+5\,d\,x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\right)$$

## Problem 194: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 155 leaves, 6 steps):

$$\frac{\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}+\frac{\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{6\,a^3\,d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 334 leaves):

$$\frac{1}{15\,a^3\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^6\left(\left(4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\left(3\left(1+e^{2\,i\,(c+d\,x)}\right)+3\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2\,i\,c}\right)\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\right)-1\Big/\left(8\,d\right)\sqrt{\text{Cos}[c+d\,x]}\left(4\,\text{Cos}\left[\frac{1}{2}(c-d\,x)\right]+26\,\text{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]+10\,\text{Cos}\left[\frac{1}{2}(c+3\,d\,x)\right]+5\,\text{Cos}\left[\frac{1}{2}(5\,c+3\,d\,x)\right]+3\,\text{Cos}\left[\frac{1}{2}(3\,c+5\,d\,x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\right)$$

## Problem 195: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 155 leaves, 6 steps):

$$\frac{9\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}+\frac{\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{2\,a^3\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{9\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 705 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)-$$
$$\left(2\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}$$
$$\left(-\frac{36\,\text{Csc}[c]}{5\,d}-\frac{36\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}-\frac{8\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}-\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}-\frac{8\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{5\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 196: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 181 leaves, 7 steps):

$$-\frac{49\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{10 a^3 d}-\frac{13\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{6 a^3 d}+\frac{49\,\text{Sin}[c+d x]}{10 a^3 d\sqrt{\text{Cos}[c+d x]}}-\frac{\text{Sin}[c+d x]}{5 d\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^3}-\frac{8\,\text{Sin}[c+d x]}{15 a d\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^2}-\frac{13\,\text{Sin}[c+d x]}{6 d\sqrt{\text{Cos}[c+d x]}\,\left(a^3+a^3\,\text{Cos}[c+d x]\right)}$$

Result (type 5, 364 leaves):

$$\frac{1}{15 a^3 (1+\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^6\left(-\left(4\,i\sqrt{2}\,e^{-i(c+d x)}\left(147\left(1+e^{2 i (c+d x)}\right)+147\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i (c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]-65\,e^{i (c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i (c+d x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]\right)\right)\Big/\left(d\left(-1+e^{2 i c}\right)\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\right)+\frac{1}{16 d\sqrt{\text{Cos}[c+d x]}}\left(1284\,\text{Cos}\left[\frac{1}{2}(c-d x)\right]+921\,\text{Cos}\left[\frac{1}{2}(3 c+d x)\right]+1243\,\text{Cos}\left[\frac{1}{2}(c+3 d x)\right]+374\,\text{Cos}\left[\frac{1}{2}(5 c+3 d x)\right]+670\,\text{Cos}\left[\frac{1}{2}(3 c+5 d x)\right]+65\,\text{Cos}\left[\frac{1}{2}(7 c+5 d x)\right]+147\,\text{Cos}\left[\frac{1}{2}(5 c+7 d x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^5\right)$$

- **Problem 197: Result unnecessarily involves higher level functions.**

$$\int\frac{1}{\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^3}\,dx$$

Optimal (type 4, 207 leaves, 8 steps):

$$\frac{119\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{10 a^3 d}+\frac{11\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{2 a^3 d}+\frac{11\,\text{Sin}[c+d x]}{2 a^3 d\,\text{Cos}[c+d x]^{3/2}}-\frac{119\,\text{Sin}[c+d x]}{10 a^3 d\sqrt{\text{Cos}[c+d x]}}-\frac{\text{Sin}[c+d x]}{5 d\,\text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^3}-\frac{2\,\text{Sin}[c+d x]}{3 a d\,\text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^2}-\frac{119\,\text{Sin}[c+d x]}{30 d\,\text{Cos}[c+d x]^{3/2}\,\left(a^3+a^3\,\text{Cos}[c+d x]\right)}$$

Result (type 5, 394 leaves):

$$\frac{1}{5\,a^3\,(1+\mathrm{Cos}[c+d\,x])^3}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^6$$

$$\left(\left(\left(4\,\mathrm{i}\,\sqrt{2}\,e^{-\mathrm{i}\,(c+d\,x)}\left(119\left(1+e^{2\,\mathrm{i}\,(c+d\,x)}\right)+119\left(-1+e^{2\,\mathrm{i}\,c}\right)\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,(c+d\,x)}\right]-55\,e^{\mathrm{i}\,(c+d\,x)}\left(-1+e^{2\,\mathrm{i}\,c}\right)\right.\right.\right.\right.$$

$$\left.\left.\left.\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,\mathrm{i}\,(c+d\,x)}\right]\right)\right)\right)\Big/\left(d\left(-1+e^{2\,\mathrm{i}\,c}\right)\sqrt{e^{-\mathrm{i}\,(c+d\,x)}\left(1+e^{2\,\mathrm{i}\,(c+d\,x)}\right)}\right)-\frac{1}{96\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

$$\left(5134\,\mathrm{Cos}\left[\frac{1}{2}(c-d\,x)\right]+4148\,\mathrm{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]+4664\,\mathrm{Cos}\left[\frac{1}{2}(c+3\,d\,x)\right]+2476\,\mathrm{Cos}\left[\frac{1}{2}(5\,c+3\,d\,x)\right]+3340\,\mathrm{Cos}\left[\frac{1}{2}(3\,c+5\,d\,x)\right]+\right.$$

$$\left.\left.944\,\mathrm{Cos}\left[\frac{1}{2}(7\,c+5\,d\,x)\right]+1620\,\mathrm{Cos}\left[\frac{1}{2}(5\,c+7\,d\,x)\right]+165\,\mathrm{Cos}\left[\frac{1}{2}(9\,c+7\,d\,x)\right]+357\,\mathrm{Cos}\left[\frac{1}{2}(7\,c+9\,d\,x)\right]\right)\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\right)$$

- **Problem 198: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;dx$$

Optimal (type 3, 154 leaves, 5 steps):

$$\frac{5\,\sqrt{a}\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{5\,a\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{5\,a\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 437 leaves):

$$\frac{1}{48\,d\,\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}}\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(-15\,\mathrm{i}\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]+\right.$$

$$15\,\mathrm{i}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{d\,x}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)+$$

$$15\,\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+$$

$$28\,\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}\;\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\left.6\,\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}\;\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+4\,\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}\;\mathrm{Sin}\left[\frac{5}{2}(c+d\,x)\right]\right)$$

- **Problem 199: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;dx$$

Optimal (type 3, 116 leaves, 4 steps):

$$\frac{3\sqrt{a}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{3\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 396 leaves) :

$$\frac{1}{8\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$
$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(-3\,i\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$3\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.4\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)$$

- **Problem 200: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 72 leaves, 3 steps) :

$$\frac{\sqrt{a}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{a\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 354 leaves) :

$$\frac{1}{2\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$
$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(-i\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.2\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

## Problem 201: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{a + a \operatorname{Cos}[c + d x]}}{\sqrt{\operatorname{Cos}[c + d x]}} \, dx$$

Optimal (type 3, 37 leaves, 2 steps):

$$\frac{2 \sqrt{a} \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{d}$$

Result (type 3, 246 leaves):

$$\left(i e^{\frac{i d x}{2}} \sqrt{a (1 + \operatorname{Cos}[c + d x])} \left(\operatorname{ArcTanh}\left[\left(\operatorname{Cos}\left[\frac{c}{2}\right] + i \operatorname{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}\,\right] - \operatorname{Log}\left[2 \left(e^{i d x} \operatorname{Cos}\left[\frac{c}{2}\right] + i e^{i d x} \operatorname{Sin}\left[\frac{c}{2}\right] + \sqrt{\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}\right)\right]\right) \operatorname{Sec}\left[\frac{1}{2} (c + d x)\right] \sqrt{e^{-i d x} \left(\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}\right)$$

## Problem 206: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \operatorname{Cos}[c + d x]^{3/2} (a + a \operatorname{Cos}[c + d x])^{3/2} \, dx$$

Optimal (type 3, 160 leaves, 6 steps):

$$\frac{11 a^{3/2} \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{8 d} + \frac{11 a^2 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Sin}[c + d x]}{8 d \sqrt{a + a \operatorname{Cos}[c + d x]}} + \frac{11 a^2 \operatorname{Cos}[c + d x]^{3/2} \operatorname{Sin}[c + d x]}{12 d \sqrt{a + a \operatorname{Cos}[c + d x]}} + \frac{a^2 \operatorname{Cos}[c + d x]^{5/2} \operatorname{Sin}[c + d x]}{3 d \sqrt{a + a \operatorname{Cos}[c + d x]}}$$

Result (type 3, 438 leaves):

$$\frac{1}{48 d \sqrt{\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}} a \sqrt{\operatorname{Cos}[c + d x]} \sqrt{a (1 + \operatorname{Cos}[c + d x])} \operatorname{Sec}\left[\frac{1}{2} (c + d x)\right] \left(-33 i \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Log}\left[2 \left(e^{i d x} \operatorname{Cos}\left[\frac{c}{2}\right] + i e^{i d x} \operatorname{Sin}\left[\frac{c}{2}\right] + \sqrt{\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}\right)\right] + 33 i \operatorname{ArcTanh}\left[\left(\operatorname{Cos}\left[\frac{c}{2}\right] + i \operatorname{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}\,\right] \left(\operatorname{Cos}\left[\frac{d x}{2}\right] + i \operatorname{Sin}\left[\frac{d x}{2}\right]\right) + 33 \operatorname{Log}\left[2 \left(e^{i d x} \operatorname{Cos}\left[\frac{c}{2}\right] + i e^{i d x} \operatorname{Sin}\left[\frac{c}{2}\right] + \sqrt{\left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]}\right)\right] \operatorname{Sin}\left[\frac{d x}{2}\right] + 52 \sqrt{2} \sqrt{\operatorname{Cos}[c + d x] (\operatorname{Cos}[d x] + i \operatorname{Sin}[d x])} \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right] + 18 \sqrt{2} \sqrt{\operatorname{Cos}[c + d x] (\operatorname{Cos}[d x] + i \operatorname{Sin}[d x])} \operatorname{Sin}\left[\frac{3}{2} (c + d x)\right] + 4 \sqrt{2} \sqrt{\operatorname{Cos}[c + d x] (\operatorname{Cos}[d x] + i \operatorname{Sin}[d x])} \operatorname{Sin}\left[\frac{5}{2} (c + d x)\right]\right)$$

- **Problem 207: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^{3/2}\,dx$$

Optimal (type 3, 120 leaves, 5 steps):

$$\frac{7 a^{3/2}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{4 d}+\frac{7 a^2 \sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 d \sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a^2\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2 d \sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 397 leaves):

$$\frac{1}{8 d \sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}}\,a \sqrt{\text{Cos}[c+d x]}\,\sqrt{a\,(1+\text{Cos}[c+d x])}$$
$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]\left(-7 i\,\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$7 i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$7\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$\left.12\sqrt{2}\,\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+2\sqrt{2}\,\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{3}{2}(c+d x)\right]\right)$$

- **Problem 208: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d x])^{3/2}}{\sqrt{\text{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 75 leaves, 4 steps):

$$\frac{3 a^{3/2}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{d}+\frac{a^2 \sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{d \sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 356 leaves):

$$\frac{1}{2\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$
$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(-3\,i\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$3\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.2\,\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 209: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 76 leaves, 4 steps):

$$\frac{2\,a^{3/2}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^2\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 292 leaves):

$$\frac{1}{\sqrt{2}\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\,a\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)\,\left(i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\text{Cos}[c+d\,x]-\right.$$
$$i\,\text{Cos}[c+d\,x]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+$$
$$\left.2\,\sqrt{2}\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]-i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 213: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,dx$$

Optimal (type 3, 200 leaves, 6 steps):

$$\frac{163\, a^{5/2}\, \text{ArcSin}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{64\, d}+\frac{163\, a^3 \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{64\, d \sqrt{a+a \text{Cos}[c+d x]}}+$$

$$\frac{163\, a^3 \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{96\, d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{17\, a^3 \text{Cos}[c+d x]^{5/2} \text{Sin}[c+d x]}{24\, d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{a^2 \text{Cos}[c+d x]^{5/2} \sqrt{a+a \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{4\, d}$$

Result (type 3, 481 leaves) :

$$\frac{1}{384\, d \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}}\, a^2 \sqrt{\text{Cos}[c+d x]}\, \sqrt{a\, (1+\text{Cos}[c+d x])}$$
$$\text{Sec}\left[\frac{1}{2}\,(c+d x)\right] \left(-489\, i\, \text{Cos}\left[\frac{d x}{2}\right] \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right]+\right.$$
$$489\, i\, \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right] \left(\text{Cos}\left[\frac{d x}{2}\right]+i\, \text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$489\, \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[\frac{d x}{2}\right]+$$
$$800 \sqrt{2} \sqrt{\text{Cos}[c+d x]\, (\text{Cos}[d x]+i\, \text{Sin}[d x])}\, \text{Sin}\left[\frac{1}{2}\,(c+d x)\right]+270 \sqrt{2} \sqrt{\text{Cos}[c+d x]\, (\text{Cos}[d x]+i\, \text{Sin}[d x])}\, \text{Sin}\left[\frac{3}{2}\,(c+d x)\right]+$$
$$\left.80 \sqrt{2} \sqrt{\text{Cos}[c+d x]\, (\text{Cos}[d x]+i\, \text{Sin}[d x])}\, \text{Sin}\left[\frac{5}{2}\,(c+d x)\right]+12 \sqrt{2} \sqrt{\text{Cos}[c+d x]\, (\text{Cos}[d x]+i\, \text{Sin}[d x])}\, \text{Sin}\left[\frac{7}{2}\,(c+d x)\right]\right)$$

- **Problem 214: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{\text{Cos}[c+d x]}\, (a+a \text{Cos}[c+d x])^{5/2}\, dx$$

Optimal (type 3, 160 leaves, 5 steps) :

$$\frac{25\, a^{5/2}\, \text{ArcSin}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{8\, d}+\frac{25\, a^3 \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{8\, d \sqrt{a+a \text{Cos}[c+d x]}}+$$

$$\frac{13\, a^3 \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{12\, d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{a^2 \text{Cos}[c+d x]^{3/2} \sqrt{a+a \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{3\, d}$$

Result (type 3, 440 leaves) :

$$\frac{1}{48\,d\,\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}}\,a^2\sqrt{\operatorname{Cos}[c+d x]}\,\sqrt{a\,(1+\operatorname{Cos}[c+d x])}$$
$$\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]\left(-75\,i\operatorname{Cos}\left[\frac{d x}{2}\right]\operatorname{Log}\left[2\left(e^{i d x}\operatorname{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\operatorname{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right]+\right.$$
$$75\,i\operatorname{ArcTanh}\left[\left(\operatorname{Cos}\left[\frac{c}{2}\right]+i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right]\left(\operatorname{Cos}\left[\frac{d x}{2}\right]+i\operatorname{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$75\operatorname{Log}\left[2\left(e^{i d x}\operatorname{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\operatorname{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right]\operatorname{Sin}\left[\frac{d x}{2}\right]+$$
$$124\sqrt{2}\,\sqrt{\operatorname{Cos}[c+d x]\,(\operatorname{Cos}[d x]+i\operatorname{Sin}[d x])}\,\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+$$
$$\left.30\sqrt{2}\,\sqrt{\operatorname{Cos}[c+d x]\,(\operatorname{Cos}[d x]+i\operatorname{Sin}[d x])}\,\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]+4\sqrt{2}\,\sqrt{\operatorname{Cos}[c+d x]\,(\operatorname{Cos}[d x]+i\operatorname{Sin}[d x])}\,\operatorname{Sin}\left[\frac{5}{2}(c+d x)\right]\right)$$

- **Problem 215: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\operatorname{Cos}[c+d x])^{5/2}}{\sqrt{\operatorname{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 120 leaves, 4 steps) :

$$\frac{19\,a^{5/2}\operatorname{ArcSin}\left[\frac{\sqrt{a}\operatorname{Sin}[c+d x]}{\sqrt{a+a\operatorname{Cos}[c+d x]}}\right]}{4\,d}+\frac{9\,a^3\sqrt{\operatorname{Cos}[c+d x]}\,\operatorname{Sin}[c+d x]}{4\,d\sqrt{a+a\operatorname{Cos}[c+d x]}}+\frac{a^2\sqrt{\operatorname{Cos}[c+d x]}\,\sqrt{a+a\operatorname{Cos}[c+d x]}\,\operatorname{Sin}[c+d x]}{2\,d}$$

Result (type 3, 399 leaves) :

$$\frac{1}{8\,d\,\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}}\,a^2\sqrt{\operatorname{Cos}[c+d x]}\,\sqrt{a\,(1+\operatorname{Cos}[c+d x])}$$
$$\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]\left(-19\,i\operatorname{Cos}\left[\frac{d x}{2}\right]\operatorname{Log}\left[2\left(e^{i d x}\operatorname{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\operatorname{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right]+\right.$$
$$19\,i\operatorname{ArcTanh}\left[\left(\operatorname{Cos}\left[\frac{c}{2}\right]+i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right]\left(\operatorname{Cos}\left[\frac{d x}{2}\right]+i\operatorname{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$19\operatorname{Log}\left[2\left(e^{i d x}\operatorname{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\operatorname{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right]\operatorname{Sin}\left[\frac{d x}{2}\right]+$$
$$\left.20\sqrt{2}\,\sqrt{\operatorname{Cos}[c+d x]\,(\operatorname{Cos}[d x]+i\operatorname{Sin}[d x])}\,\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+2\sqrt{2}\,\sqrt{\operatorname{Cos}[c+d x]\,(\operatorname{Cos}[d x]+i\operatorname{Sin}[d x])}\,\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]\right)$$

- **Problem 216: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\operatorname{Cos}[c+d x])^{5/2}}{\operatorname{Cos}[c+d x]^{3/2}}\,dx$$

Optimal (type 3, 114 leaves, 4 steps):

$$\frac{5 a^{5/2} \text{ArcSin}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{d}-\frac{a^3 \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{2 a^2 \sqrt{a+a \text{Cos}[c+d x]} \text{Sin}[c+d x]}{d \sqrt{\text{Cos}[c+d x]}}$$

Result (type 3, 570 leaves):

$$\frac{1}{4 \sqrt{2} d \sqrt{\text{Cos}[c+d x]} \sqrt{\text{Cos}[c+d x] (\text{Cos}[d x]+i \text{Sin}[d x])}} a^2 \sqrt{a (1+\text{Cos}[c+d x])} \text{Sec}\left[\frac{1}{2} (c+d x)\right]$$
$$\left(-5 i \text{Cos}\left[c+\frac{d x}{2}\right] \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right]-\right.$$
$$5 i \text{Cos}\left[c+\frac{3 d x}{2}\right] \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right]+$$
$$10 i \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right] \text{Cos}[c+d x] \left(\text{Cos}\left[\frac{d x}{2}\right]+i \text{Sin}\left[\frac{d x}{2}\right]\right)-$$
$$5 \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[c+\frac{d x}{2}\right]+$$
$$6 \sqrt{2} \sqrt{\text{Cos}[c+d x] (\text{Cos}[d x]+i \text{Sin}[d x])} \text{Sin}\left[\frac{1}{2} (c+d x)\right]+2 \sqrt{2} \sqrt{\text{Cos}[c+d x] (\text{Cos}[d x]+i \text{Sin}[d x])} \text{Sin}\left[\frac{3}{2} (c+d x)\right]+$$
$$\left.5 \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[c+\frac{3 d x}{2}\right]\right)$$

- **Problem 217: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a \text{Cos}[c+d x])^{5/2}}{\text{Cos}[c+d x]^{5/2}} \, dx$$

Optimal (type 3, 118 leaves, 4 steps):

$$\frac{2 a^{5/2} \text{ArcSin}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{d}+\frac{14 a^3 \text{Sin}[c+d x]}{3 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}+\frac{2 a^2 \sqrt{a+a \text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 3, 850 leaves):

$$\frac{1}{4}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5$$

$$\left(\frac{1}{2}\,i\,\mathrm{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(\frac{4\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}+\frac{\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{6\,d}\right)$$

- **Problem 222: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\mathrm{Cos}[e+f\,x]}}{\sqrt{\mathrm{Cos}[e+f\,x]}}\,dx$$

Optimal (type 3, 37 leaves, 2 steps):

$$\frac{2\,\sqrt{a}\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[e+f\,x]}{\sqrt{a+a\,\mathrm{Cos}[e+f\,x]}}\right]}{f}$$

Result (type 3, 246 leaves):

$$\left(i\,e^{\frac{i\,f\,x}{2}}\,\sqrt{a\,(1+\mathrm{Cos}[e+f\,x])}\,\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{e}{2}\right]+i\,\mathrm{Sin}\left[\frac{e}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,f\,x}\right)\mathrm{Cos}[e]+i\left(-1+e^{2\,i\,f\,x}\right)\mathrm{Sin}[e]}\right]-\right.\right.$$

$$\left.\mathrm{Log}\left[2\left(e^{i\,f\,x}\,\mathrm{Cos}\left[\frac{e}{2}\right]+i\,e^{i\,f\,x}\,\mathrm{Sin}\left[\frac{e}{2}\right]+\sqrt{\left(1+e^{2\,i\,f\,x}\right)\mathrm{Cos}[e]+i\left(-1+e^{2\,i\,f\,x}\right)\mathrm{Sin}[e]}\right)\right]\right)\mathrm{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]$$

$$\left.\sqrt{e^{-i\,f\,x}\left(\left(1+e^{2\,i\,f\,x}\right)\mathrm{Cos}[e]+i\left(-1+e^{2\,i\,f\,x}\right)\mathrm{Sin}[e]\right)}\right)\Big/\left(f\,\sqrt{2\left(1+e^{2\,i\,f\,x}\right)\mathrm{Cos}[e]+2\,i\left(-1+e^{2\,i\,f\,x}\right)\mathrm{Sin}[e]}\right)$$

- **Problem 223: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a-a\,\text{Cos}[e+f\,x]}}{\sqrt{-\text{Cos}[e+f\,x]}}\,dx$$

Optimal (type 3, 38 leaves, 2 steps) :

$$-\frac{2\sqrt{a}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[e+f\,x]}{\sqrt{a-a\,\text{Cos}[e+f\,x]}}\right]}{f}$$

Result (type 3, 214 leaves) :

$$\left(\sqrt{-\text{Cos}[e+f\,x]}\,\sqrt{a-a\,\text{Cos}[e+f\,x]}\,\text{Csc}\left[\frac{1}{2}\,(e+f\,x)\right]\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{e}{2}\right]+i\,\text{Sin}\left[\frac{e}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,f\,x}\right)\text{Cos}[e]+i\left(-1+e^{2\,i\,f\,x}\right)\text{Sin}[e]}\right]+\text{Log}\left[2\left(e^{i\,f\,x}\,\text{Cos}\left[\frac{e}{2}\right]+i\,e^{i\,f\,x}\,\text{Sin}\left[\frac{e}{2}\right]+\sqrt{\left(1+e^{2\,i\,f\,x}\right)\text{Cos}[e]+i\left(-1+e^{2\,i\,f\,x}\right)\text{Sin}[e]}\right)\right]\right)\left(\text{Cos}\left[\frac{f\,x}{2}\right]+i\,\text{Sin}\left[\frac{f\,x}{2}\right]\right)\right)\Big/\left(\sqrt{2}\,f\,\sqrt{\text{Cos}[e+f\,x]\,(\text{Cos}[f\,x]+i\,\text{Sin}[f\,x])}\right)$$

- **Problem 224: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\text{Cos}[c+d\,x]^{5/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 171 leaves, 7 steps) :

$$\frac{7\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\sqrt{a}\,d}-\frac{\sqrt{2}\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 251 leaves) :

$$\frac{1}{8\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(7\,d\,x-7\,i\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+8\,i\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+7\,i\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\sqrt{\text{Cos}[c+d\,x]}\left(-2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)}{d}\right)$$

- **Problem 225: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\text{Cos}[c+d\,x]^{3/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 128 leaves, 6 steps) :

$$-\frac{\text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\ d}+\frac{\sqrt{2}\ \text{ArcTan}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{2}\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\ d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 233 leaves) :

$$\frac{1}{2\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(-i\,d\,x-\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+2\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,\sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{d}\right)$$

- **Problem 226: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 95 leaves, 5 steps) :

$$\frac{2\,\text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\ d}-\frac{\sqrt{2}\ \text{ArcTan}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{2}\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\ d}$$

Result (type 3, 197 leaves) :

$$\left(\left(1+e^{i\,(c+d\,x)}\right)\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(d\,x-i\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+i\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/\left(\sqrt{2}\,d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 227: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 56 leaves, 2 steps) :

$$\frac{\sqrt{2}\ \text{ArcTan}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{2}\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\ d}$$

Result (type 3, 136 leaves) :

$$-\frac{i\left(1+e^{i(c+dx)}\right)\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)}{d\sqrt{1+e^{2i(c+dx)}}\sqrt{a(1+\mathrm{Cos}[c+dx])}}$$

- **Problem 228: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\mathrm{Cos}[c+dx]^{3/2}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 93 leaves, 4 steps):

$$-\frac{\sqrt{2}\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{2}\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}+\frac{2\,\mathrm{Sin}[c+dx]}{d\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}$$

Result (type 3, 146 leaves):

$$\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]\left(i\sqrt{2}\,e^{-\frac{1}{2}i(c+dx)}\sqrt{1+e^{2i(c+dx)}}\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)+4\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/\left(d\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a(1+\mathrm{Cos}[c+dx])}\right)$$

- **Problem 229: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\mathrm{Cos}[c+dx]^{5/2}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 131 leaves, 5 steps):

$$\frac{\sqrt{2}\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{2}\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}+\frac{2\,\mathrm{Sin}[c+dx]}{3d\,\mathrm{Cos}[c+dx]^{3/2}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}-\frac{2\,\mathrm{Sin}[c+dx]}{3d\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}$$

Result (type 3, 177 leaves):

$$\frac{1}{\sqrt{a(1+\mathrm{Cos}[c+dx])}}\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]\left(-\frac{2\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)}{d\sqrt{1+e^{2i(c+dx)}}}+\frac{8\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^3}{3d\,\mathrm{Cos}[c+dx]^{3/2}}\right)$$

- **Problem 230: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\mathrm{Cos}[c+dx]^{7/2}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 169 leaves, 6 steps):

$$-\frac{\sqrt{2}\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{26\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 195 leaves) :

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\frac{2\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)}{d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}}+\frac{4\,\left(3-\text{Cos}[c+d\,x]+13\,\text{Cos}[c+d\,x]^2\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{15\,d\,\text{Cos}[c+d\,x]^{5/2}}\right)$$

- **Problem 231: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}}{\sqrt{1+\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 126 leaves, 7 steps) :

$$-\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right]}{d}+\frac{7\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{1+\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{1+\text{Cos}[c+d\,x]}}+\frac{\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{1+\text{Cos}[c+d\,x]}}$$

Result (type 3, 249 leaves) :

$$\frac{1}{8\,\sqrt{1+\text{Cos}[c+d\,x]}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(7\,d\,x-7\,i\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+8\,i\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+7\,i\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,\sqrt{\text{Cos}[c+d\,x]}\,\left(-2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)}{d}\right)$$

- **Problem 232: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}}{\sqrt{1+\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 85 leaves, 6 steps) :

$$\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right]}{d}-\frac{\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{\sqrt{1+\text{Cos}[c+d x]}}\right]}{d}+\frac{\sqrt{\text{Cos}[c+d x]}\;\text{Sin}[c+d x]}{d\sqrt{1+\text{Cos}[c+d x]}}$$

Result (type 3, 231 leaves) :

$$\frac{1}{2\sqrt{1+\text{Cos}[c+d x]}}\text{Cos}\left[\frac{1}{2}(c+d x)\right]\left(-1\Big/\left(d\sqrt{1+e^{2 i (c+d x)}}\right) i\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\left(-i d x-\text{ArcSinh}\left[e^{i (c+d x)}\right]+2\sqrt{2}\,\text{Log}\left[1+e^{i (c+d x)}\right]+\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-2\sqrt{2}\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)+\frac{4\sqrt{\text{Cos}[c+d x]}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{d}\right)$$

- **Problem 233: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d x]}}{\sqrt{1+\text{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 54 leaves, 5 steps) :

$$-\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right]}{d}+\frac{2\,\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{\sqrt{1+\text{Cos}[c+d x]}}\right]}{d}$$

Result (type 3, 170 leaves) :

$$\frac{1}{d\sqrt{1+e^{2 i (c+d x)}}}\left(1+e^{i (c+d x)}\right)\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\left(d x-i\,\text{ArcSinh}\left[e^{i (c+d x)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i (c+d x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)$$

- **Problem 234: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+d x]}\;\sqrt{1+\text{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 27 leaves, 2 steps) :

$$\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right]}{d}$$

Result (type 3, 134 leaves) :

$$-\frac{i\left(1+e^{i(c+dx)}\right)\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)}{d\sqrt{1+e^{2i(c+dx)}}\sqrt{1+\text{Cos}[c+dx]}}$$

- **Problem 235: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+dx]^{3/2}\sqrt{1+\text{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 62 leaves, 3 steps):

$$-\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+dx]}{1+\text{Cos}[c+dx]}\right]}{d}+\frac{2\,\text{Sin}[c+dx]}{d\sqrt{\text{Cos}[c+dx]}\sqrt{1+\text{Cos}[c+dx]}}$$

Result (type 3, 144 leaves):

$$\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]\left(i\sqrt{2}\,e^{-\frac{1}{2}i(c+dx)}\sqrt{1+e^{2i(c+dx)}}\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)+4\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/\left(d\sqrt{\text{Cos}[c+dx]}\sqrt{1+\text{Cos}[c+dx]}\right)$$

- **Problem 236: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\text{Cos}[c+dx]^{5/2}\sqrt{1+\text{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 98 leaves, 5 steps):

$$\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+dx]}{1+\text{Cos}[c+dx]}\right]}{d}+\frac{2\,\text{Sin}[c+dx]}{3\,d\,\text{Cos}[c+dx]^{3/2}\sqrt{1+\text{Cos}[c+dx]}}-\frac{2\,\text{Sin}[c+dx]}{3\,d\sqrt{\text{Cos}[c+dx]}\sqrt{1+\text{Cos}[c+dx]}}$$

Result (type 3, 175 leaves):

$$\frac{1}{\sqrt{1+\text{Cos}[c+dx]}}\text{Cos}\left[\frac{1}{2}(c+dx)\right]\left(-\frac{2\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)}{d\sqrt{1+e^{2i(c+dx)}}}+\frac{8\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]^3}{3\,d\,\text{Cos}[c+dx]^{3/2}}\right)$$

- **Problem 237: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\text{Cos}[c+dx]^{7/2}\sqrt{1+\text{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 134 leaves, 6 steps):

$$-\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right]}{d}+\frac{2\,\text{Sin}[c+d x]}{5 d\,\text{Cos}[c+d x]^{5/2}\sqrt{1+\text{Cos}[c+d x]}}-\frac{2\,\text{Sin}[c+d x]}{15 d\,\text{Cos}[c+d x]^{3/2}\sqrt{1+\text{Cos}[c+d x]}}+\frac{26\,\text{Sin}[c+d x]}{15 d\sqrt{\text{Cos}[c+d x]}\sqrt{1+\text{Cos}[c+d x]}}$$

Result (type 3, 193 leaves):

$$\frac{1}{\sqrt{1+\text{Cos}[c+d x]}}\text{Cos}\left[\frac{1}{2}(c+d x)\right]\left(\frac{2\,i\,e^{\frac{1}{2}i(c+d x)}\sqrt{e^{-i(c+d x)}\left(1+e^{2 i(c+d x)}\right)}\left(\text{Log}\left[1+e^{i(c+d x)}\right]-\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2 i(c+d x)}}\right]\right)}{d\sqrt{1+e^{2 i(c+d x)}}}+\right.$$
$$\left.\frac{4\left(3-\text{Cos}[c+d x]+13\,\text{Cos}[c+d x]^2\right)\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{15 d\,\text{Cos}[c+d x]^{5/2}}\right)$$

## ■ Problem 238: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cos}[c+d x]^{5/2}}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 174 leaves, 7 steps):

$$-\frac{3\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{3/2} d}+\frac{9\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\sqrt{\text{Cos}[c+d x]}\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\sqrt{2}\,a^{3/2} d}-\frac{\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2 d\,(a+a\,\text{Cos}[c+d x])^{3/2}}+\frac{3\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{2 a d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 262 leaves):

$$\frac{1}{2\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^3\left(-1\Big/\left(d\sqrt{1+e^{2 i(c+d x)}}\right)3\,i\sqrt{2}\,e^{\frac{1}{2}i(c+d x)}\sqrt{e^{-i(c+d x)}\left(1+e^{2 i(c+d x)}\right)}\right.$$
$$\left(-2\,i\,d x-2\,\text{ArcSinh}\left[e^{i(c+d x)}\right]+3\sqrt{2}\,\text{Log}\left[1+e^{i(c+d x)}\right]+2\,\text{Log}\left[1+\sqrt{1+e^{2 i(c+d x)}}\right]-3\sqrt{2}\,\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2 i(c+d x)}}\right]\right)+$$
$$\left.\frac{2\sqrt{\text{Cos}[c+d x]}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(2\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{3}{2}(c+d x)\right]\right)}{d}\right)$$

## ■ Problem 239: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\text{Cos}[c+d x]^{3/2}}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 134 leaves, 6 steps):

$$\frac{2\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{3/2} d}-\frac{5\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\sqrt{\text{Cos}[c+d x]}\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\sqrt{2}\,a^{3/2} d}-\frac{\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{2 d\,(a+a\,\text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 312 leaves):

$$\left(e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(4 d x-4 i \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]+5 i \sqrt{2} \operatorname{Log}\left[1+e^{i (c+d x)}\right]+4 i \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-5 i \sqrt{2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(\sqrt{2} d \sqrt{1+e^{2 i (c+d x)}} (a (1+\operatorname{Cos}[c+d x]))^{3/2}\right)+\frac{\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \sqrt{\operatorname{Cos}[c+d x]} \left(-\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{d}-\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{d}\right)}{(a (1+\operatorname{Cos}[c+d x]))^{3/2}}$$

- **Problem 240: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]}}{(a+a \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 3, 97 leaves, 4 steps):

$$\frac{\operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}+\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 248 leaves):

$$-\left(i e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(d \sqrt{1+e^{2 i (c+d x)}} (a (1+\operatorname{Cos}[c+d x]))^{3/2}\right)+\frac{\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \sqrt{\operatorname{Cos}[c+d x]} \left(\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{d}+\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{d}\right)}{(a (1+\operatorname{Cos}[c+d x]))^{3/2}}$$

- **Problem 241: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{\operatorname{Cos}[c+d x]} (a+a \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 3, 97 leaves, 4 steps):

$$\frac{3 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}-\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 250 leaves):

$$-\left(3 i e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(d \sqrt{1+e^{2 i (c+d x)}} (a (1+\operatorname{Cos}[c+d x]))^{3/2}\right)+\frac{\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \sqrt{\operatorname{Cos}[c+d x]} \left(-\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{d}-\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{d}\right)}{(a (1+\operatorname{Cos}[c+d x]))^{3/2}}$$

## Problem 242: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 137 leaves, 5 steps):

$$-\frac{7\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{5\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 272 leaves):

$$\left(7\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\right)+\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\sqrt{\text{Cos}[c+d\,x]}\,\left(\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+\frac{8\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Tan}\left[\frac{c}{2}\right]}{d}\right)}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$

## Problem 243: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 177 leaves, 6 steps):

$$\frac{11\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{\text{Sin}[c+d\,x]}{2\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+$$
$$\frac{7\,\text{Sin}[c+d\,x]}{6\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{19\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 304 leaves):

$$-\left(11\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\sqrt{\text{Cos}[c+d\,x]}\,\left(-\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d}-\frac{32\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}+\frac{8\,\text{Sec}[c+d\,x]^2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

## Problem 244: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d\,x]^{7/2}}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 214 leaves, 8 steps) :

$$-\frac{5\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{5/2}\,d}+\frac{115\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{16\sqrt{2}\,a^{5/2}\,d}-\frac{\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{4\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}}-\frac{15\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}+\frac{35\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{16\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 414 leaves) :

$$-\left(5\,i\,e^{\frac{1}{2} i\,(c+d x)}\sqrt{e^{-i\,(c+d x)}\left(1+e^{2 i\,(c+d x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(-16\,i\,d x-16\,\text{ArcSinh}\left[e^{i\,(c+d x)}\right]+23\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d x)}\right]+16\,\text{Log}\left[1+\sqrt{1+e^{2 i\,(c+d x)}}\right]-23\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d x)}+\sqrt{2}\sqrt{1+e^{2 i\,(c+d x)}}\right]\right)\right)\Big/\left(4\sqrt{2}\,d\sqrt{1+e^{2 i\,(c+d x)}}\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{5/2}}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Cos}[c+d x]}\left(\frac{8\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}+\frac{8\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{d}+\frac{23\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Sin}\left[\frac{d x}{2}\right]}{4\,d}-\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Sin}\left[\frac{d x}{2}\right]}{2\,d}+\frac{23\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{4\,d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{2\,d}\right)$$

- **Problem 245: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{5/2}}{(a+a\,\text{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 3, 174 leaves, 7 steps) :

$$\frac{2\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{5/2}\,d}-\frac{43\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{16\sqrt{2}\,a^{5/2}\,d}-\frac{\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{4\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}}-\frac{11\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 382 leaves) :

$$\left(e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(32 d x-32 i \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]+43 i \sqrt{2} \operatorname{Log}\left[1+e^{i (c+d x)}\right]+32 i \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-43 i \sqrt{2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 \sqrt{2} d \sqrt{1+e^{2 i (c+d x)}} (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{5/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\operatorname{Cos}[c+d x]} \left(-\frac{15 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{2 d}-\frac{15 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 246: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\operatorname{Cos}[c+d x]^{3/2}}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 137 leaves, 5 steps):

$$\frac{3 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}+\frac{7 \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 319 leaves):

$$-\left(3 i e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 d \sqrt{1+e^{2 i (c+d x)}} (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{5/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\operatorname{Cos}[c+d x]} \left(\frac{7 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d}-\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{2 d}+\frac{7 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 247: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]}}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 137 leaves, 5 steps):

$$\frac{5 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}+\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}+\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 319 leaves):

$$-\left(5\, i\, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 d \sqrt{1+e^{2 i (c+d x)}} \left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}\right)+\frac{1}{\left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\operatorname{Cos}[c+d x]} \left(\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{2 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 248: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{\operatorname{Cos}[c+d x]} \left(a+a \operatorname{Cos}[c+d x]\right)^{5/2}} \, dx$$

Optimal (type 3, 137 leaves, 5 steps) :

$$\frac{19 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2} d}-\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{4 d \left(a+a \operatorname{Cos}[c+d x]\right)^{5/2}}-\frac{9 \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d \left(a+a \operatorname{Cos}[c+d x]\right)^{3/2}}$$

Result (type 3, 319 leaves) :

$$-\left(19\, i\, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 d \sqrt{1+e^{2 i (c+d x)}} \left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}\right)+\frac{1}{\left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\operatorname{Cos}[c+d x]} \left(-\frac{9 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d}-\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{2 d}-\frac{9 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 249: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{\operatorname{Cos}[c+d x]^{3/2} \left(a+a \operatorname{Cos}[c+d x]\right)^{5/2}} \, dx$$

Optimal (type 3, 177 leaves, 6 steps) :

$$-\frac{75 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2} d}-\frac{\operatorname{Sin}[c+d x]}{4 d \sqrt{\operatorname{Cos}[c+d x]} \left(a+a \operatorname{Cos}[c+d x]\right)^{5/2}}-\frac{13 \operatorname{Sin}[c+d x]}{16 a d \sqrt{\operatorname{Cos}[c+d x]} \left(a+a \operatorname{Cos}[c+d x]\right)^{3/2}}+\frac{49 \operatorname{Sin}[c+d x]}{16 a^2 d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 343 leaves) :

$$\left(75\, i\, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 d \sqrt{1+e^{2 i (c+d x)}} (a (1+\cos[c+d x]))^{5/2}\right)+\frac{1}{(a (1+\cos[c+d x]))^{5/2}} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\cos[c+d x]} \left(\frac{17 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sin\left[\frac{d x}{2}\right]}{4 d}+\frac{\sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \sin\left[\frac{d x}{2}\right]}{2 d}+\frac{16 \sec[c+d x] \sin\left[\frac{c}{2}+\frac{d x}{2}\right]}{d}+\frac{17 \sec\left[\frac{c}{2}+\frac{d x}{2}\right] \tan\left[\frac{c}{2}\right]}{4 d}+\frac{\sec\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \tan\left[\frac{c}{2}\right]}{2 d}\right)$$

## Problem 250: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{\cos[c+d x]^{5/2} (a+a \cos[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 217 leaves, 7 steps) :

$$\frac{163 \text{ArcTan}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{2} \sqrt{\cos[c+d x]} \sqrt{a+a \cos[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2} d}-\frac{\sin[c+d x]}{4 d \cos[c+d x]^{3/2} (a+a \cos[c+d x])^{5/2}}-\frac{17 \sin[c+d x]}{16 a d \cos[c+d x]^{3/2} (a+a \cos[c+d x])^{3/2}}+\frac{95 \sin[c+d x]}{48 a^2 d \cos[c+d x]^{3/2} \sqrt{a+a \cos[c+d x]}}-\frac{299 \sin[c+d x]}{48 a^2 d \sqrt{\cos[c+d x]} \sqrt{a+a \cos[c+d x]}}$$

Result (type 3, 373 leaves) :

$$-\left(163\, i\, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 d \sqrt{1+e^{2 i (c+d x)}} (a (1+\cos[c+d x]))^{5/2}\right)+\frac{1}{(a (1+\cos[c+d x]))^{5/2}} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\cos[c+d x]} \left(-\frac{25 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sin\left[\frac{d x}{2}\right]}{4 d}-\frac{\sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \sin\left[\frac{d x}{2}\right]}{2 d}-\frac{112 \sec[c+d x] \sin\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}+\frac{16 \sec[c+d x]^2 \sin\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}-\frac{25 \sec\left[\frac{c}{2}+\frac{d x}{2}\right] \tan\left[\frac{c}{2}\right]}{4 d}-\frac{\sec\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \tan\left[\frac{c}{2}\right]}{2 d}\right)$$

## Problem 251: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\cos[c+d x]^{9/2}}{(a+a \cos[c+d x])^{7/2}} \, dx$$

Optimal (type 3, 254 leaves, 9 steps) :

$$-\frac{7\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{7/2}\,d}+\frac{637\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}-$$

$$\frac{7\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{259\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{189\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{64\,a^3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 477 leaves) :

$$-\left(7\,i\,e^{\frac{1}{2}i(c+d\,x)}\sqrt{e^{-i(c+d\,x)}\left(1+e^{2i(c+d\,x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\right.$$
$$\left.\left(-64\,i\,d\,x-64\,\text{ArcSinh}\left[e^{i(c+d\,x)}\right]+91\,\sqrt{2}\,\text{Log}\left[1+e^{i(c+d\,x)}\right]+64\,\text{Log}\left[1+\sqrt{1+e^{2i(c+d\,x)}}\right]-91\,\sqrt{2}\,\text{Log}\left[1-e^{i(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2i(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(8\,\sqrt{2}\,d\,\sqrt{1+e^{2i(c+d\,x)}}\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\text{Cos}[c+d\,x]}$$
$$\left(\frac{16\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}+\frac{16\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+\frac{523\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Sin}\left[\frac{d\,x}{2}\right]}{24\,d}-\frac{15\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\frac{523\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24\,d}-\frac{15\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{4\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

## Problem 252: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\text{Cos}[c+d\,x]^{7/2}}{(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 214 leaves, 8 steps) :

$$\frac{2\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{7/2}\,d}-\frac{177\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}-$$

$$\frac{\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}-\frac{17\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{49\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{64\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 445 leaves) :

$$\left(e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\operatorname{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\left(128\,dx-128\,i\operatorname{ArcSinh}\left[e^{i(c+dx)}\right]+177\,i\sqrt{2}\operatorname{Log}\left[1+e^{i(c+dx)}\right]+128\,i\operatorname{Log}\left[1+\sqrt{1+e^{2i(c+dx)}}\right]-177\,i\sqrt{2}\operatorname{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(8\sqrt{2}\,d\sqrt{1+e^{2i(c+dx)}}\,(a\,(1+\operatorname{Cos}[c+dx]))^{7/2}\right)+\frac{1}{(a\,(1+\operatorname{Cos}[c+dx]))^{7/2}}\operatorname{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\sqrt{\operatorname{Cos}[c+dx]}\left(-\frac{247\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\operatorname{Sin}\left[\frac{dx}{2}\right]}{24\,d}+\frac{11\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\operatorname{Sin}\left[\frac{dx}{2}\right]}{4\,d}-\frac{\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\operatorname{Sin}\left[\frac{dx}{2}\right]}{3\,d}-\frac{247\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\operatorname{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{11\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\operatorname{Tan}\left[\frac{c}{2}\right]}{4\,d}-\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\operatorname{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 253: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\operatorname{Cos}[c+dx]^{5/2}}{(a+a\operatorname{Cos}[c+dx])^{7/2}}\,dx$$

Optimal (type 3, 177 leaves, 6 steps) :

$$\frac{5\operatorname{ArcTan}\left[\frac{\sqrt{a}\operatorname{Sin}[c+dx]}{\sqrt{2}\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+a\operatorname{Cos}[c+dx]}}\right]}{64\sqrt{2}\,a^{7/2}\,d}-\frac{\operatorname{Cos}[c+dx]^{3/2}\operatorname{Sin}[c+dx]}{6\,d\,(a+a\operatorname{Cos}[c+dx])^{7/2}}-\frac{13\sqrt{\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{48\,a\,d\,(a+a\operatorname{Cos}[c+dx])^{5/2}}+\frac{67\sqrt{\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{192\,a^2\,d\,(a+a\operatorname{Cos}[c+dx])^{3/2}}$$

Result (type 3, 382 leaves) :

$$-\left(5\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\operatorname{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\left(\operatorname{Log}\left[1+e^{i(c+dx)}\right]-\operatorname{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(8\,d\sqrt{1+e^{2i(c+dx)}}\,(a\,(1+\operatorname{Cos}[c+dx]))^{7/2}\right)+\frac{1}{(a\,(1+\operatorname{Cos}[c+dx]))^{7/2}}\operatorname{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\sqrt{\operatorname{Cos}[c+dx]}\left(\frac{67\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\operatorname{Sin}\left[\frac{dx}{2}\right]}{24\,d}-\frac{7\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\operatorname{Sin}\left[\frac{dx}{2}\right]}{4\,d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\operatorname{Sin}\left[\frac{dx}{2}\right]}{3\,d}+\frac{67\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\operatorname{Tan}\left[\frac{c}{2}\right]}{24\,d}-\frac{7\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\operatorname{Tan}\left[\frac{c}{2}\right]}{4\,d}+\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\operatorname{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 254: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\operatorname{Cos}[c+dx]^{3/2}}{(a+a\operatorname{Cos}[c+dx])^{7/2}}\,dx$$

Optimal (type 3, 177 leaves, 6 steps) :

$$\frac{7\operatorname{ArcTan}\left[\frac{\sqrt{a}\operatorname{Sin}[c+dx]}{\sqrt{2}\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+a\operatorname{Cos}[c+dx]}}\right]}{64\sqrt{2}\,a^{7/2}\,d}-\frac{\sqrt{\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{6\,d\,(a+a\operatorname{Cos}[c+dx])^{7/2}}+\frac{3\sqrt{\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{16\,a\,d\,(a+a\operatorname{Cos}[c+dx])^{5/2}}+\frac{17\sqrt{\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{192\,a^2\,d\,(a+a\operatorname{Cos}[c+dx])^{3/2}}$$

Result (type 3, 382 leaves):

$$-\left(7\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(8\,d\sqrt{1+e^{2i(c+dx)}}\,(a\,(1+\text{Cos}[c+dx]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+dx]))^{7/2}}\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\sqrt{\text{Cos}[c+dx]}\left(\frac{17\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sin}\left[\frac{dx}{2}\right]}{24\,d}+\frac{3\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Sin}\left[\frac{dx}{2}\right]}{4\,d}-\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Sin}\left[\frac{dx}{2}\right]}{3\,d}+\frac{17\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{4\,d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 255: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+dx]}}{(a+a\,\text{Cos}[c+dx])^{7/2}}\,dx$$

Optimal (type 3, 177 leaves, 6 steps):

$$\frac{13\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\sqrt{\text{Cos}[c+dx]}\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{64\sqrt{2}\,a^{7/2}\,d}+\frac{\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{6\,d\,(a+a\,\text{Cos}[c+dx])^{7/2}}+\frac{\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{16\,a\,d\,(a+a\,\text{Cos}[c+dx])^{5/2}}-\frac{5\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+dx])^{3/2}}$$

Result (type 3, 382 leaves):

$$-\left(13\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(8\,d\sqrt{1+e^{2i(c+dx)}}\,(a\,(1+\text{Cos}[c+dx]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+dx]))^{7/2}}\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\sqrt{\text{Cos}[c+dx]}\left(-\frac{5\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sin}\left[\frac{dx}{2}\right]}{24\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Sin}\left[\frac{dx}{2}\right]}{4\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Sin}\left[\frac{dx}{2}\right]}{3\,d}-\frac{5\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{4\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 256: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+dx]}\,(a+a\,\text{Cos}[c+dx])^{7/2}}\,dx$$

Optimal (type 3, 177 leaves, 6 steps):

$$\frac{63\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}-\frac{5\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{103\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 382 leaves):

$$-\left(63\,i\,e^{\frac{1}{2}i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(8\,d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\text{Cos}[c+d\,x]}\left(-\frac{103\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sin}\left[\frac{d\,x}{2}\right]}{24\,d}-\frac{5\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}-\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}-\frac{103\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Tan}\left[\frac{c}{2}\right]}{24\,d}-\frac{5\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Tan}\left[\frac{c}{2}\right]}{4\,d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

## Problem 257: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{1}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 217 leaves, 7 steps):

$$-\frac{363\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{\text{Sin}[c+d\,x]}{6\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}-$$
$$\frac{19\,\text{Sin}[c+d\,x]}{48\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{199\,\text{Sin}[c+d\,x]}{192\,a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{691\,\text{Sin}[c+d\,x]}{192\,a^3\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 406 leaves):

$$\left(363\,i\,e^{\frac{1}{2}i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(8\,d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\text{Cos}[c+d\,x]}\left(\frac{307\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sin}\left[\frac{d\,x}{2}\right]}{24\,d}+\frac{9\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\right.$$
$$\left.\frac{32\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d}+\frac{307\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{9\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Tan}\left[\frac{c}{2}\right]}{4\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

### Problem 258: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{\text{Cos}[c+d x]^{5/2} (a+a \text{Cos}[c+d x])^{7/2}} \, dx$$

Optimal (type 3, 257 leaves, 8 steps):

$$\frac{1015 \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{64 \sqrt{2} a^{7/2} d}-\frac{\text{Sin}[c+d x]}{6 d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{7/2}}-\frac{23 \text{Sin}[c+d x]}{48 a d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{5/2}}-\frac{109 \text{Sin}[c+d x]}{64 a^2 d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{3/2}}+\frac{193 \text{Sin}[c+d x]}{64 a^3 d \text{Cos}[c+d x]^{3/2} \sqrt{a+a \text{Cos}[c+d x]}}-\frac{629 \text{Sin}[c+d x]}{64 a^3 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}$$

Result (type 3, 436 leaves):

$$-\left(1015 \, i \, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right)\Big/ \left(8 d \sqrt{1+e^{2 i (c+d x)}} (a (1+\text{Cos}[c+d x]))^{7/2}\right)+\frac{1}{(a (1+\text{Cos}[c+d x]))^{7/2}} \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\text{Cos}[c+d x]} \left(-\frac{607 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sin}\left[\frac{d x}{2}\right]}{24 d}-\frac{13 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sin}\left[\frac{d x}{2}\right]}{4 d}-\frac{\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}\left[\frac{d x}{2}\right]}{3 d}-\frac{320 \text{Sec}[c+d x] \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}+\frac{32 \text{Sec}[c+d x]^2 \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}-\frac{607 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Tan}\left[\frac{c}{2}\right]}{24 d}-\frac{13 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \text{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

### Problem 259: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]^{7/2}}{(a+a \text{Cos}[c+d x])^{9/2}} \, dx$$

Optimal (type 3, 217 leaves, 7 steps):

$$\frac{35 \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{1024 \sqrt{2} a^{9/2} d}-\frac{\text{Cos}[c+d x]^{5/2} \text{Sin}[c+d x]}{8 d (a+a \text{Cos}[c+d x])^{9/2}}-\frac{19 \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{96 a d (a+a \text{Cos}[c+d x])^{7/2}}-\frac{187 \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{768 a^2 d (a+a \text{Cos}[c+d x])^{5/2}}+\frac{853 \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{3072 a^3 d (a+a \text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 445 leaves):

$$-\left(35\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^9\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/$$
$$\left(64\,d\sqrt{1+e^{2i(c+dx)}}\,(a\,(1+\text{Cos}[c+dx]))^{9/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+dx]))^{9/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^9\sqrt{\text{Cos}[c+dx]}\left(\frac{853\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sin}\left[\frac{dx}{2}\right]}{192\,d}-\frac{145\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Sin}\left[\frac{dx}{2}\right]}{32\,d}+\frac{43\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Sin}\left[\frac{dx}{2}\right]}{24\,d}-\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\text{Sin}\left[\frac{dx}{2}\right]}{4\,d}+\frac{853\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{192\,d}-\frac{145\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{32\,d}+\frac{43\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{24\,d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\text{Tan}\left[\frac{c}{2}\right]}{4\,d}\right)$$

- **Problem 260: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+dx]^{5/2}}{(a+a\,\text{Cos}[c+dx])^{9/2}}\,dx$$

Optimal (type 3, 217 leaves, 7 steps) :

$$\frac{45\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\sqrt{\text{Cos}[c+dx]}\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{1024\sqrt{2}\,a^{9/2}\,d}-\frac{\text{Cos}[c+dx]^{3/2}\,\text{Sin}[c+dx]}{8\,d\,(a+a\,\text{Cos}[c+dx])^{9/2}}-$$
$$\frac{5\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{32\,a\,d\,(a+a\,\text{Cos}[c+dx])^{7/2}}+\frac{33\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{256\,a^2\,d\,(a+a\,\text{Cos}[c+dx])^{5/2}}+\frac{73\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{1024\,a^3\,d\,(a+a\,\text{Cos}[c+dx])^{3/2}}$$

Result (type 3, 445 leaves) :

$$-\left(45\,i\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^9\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/$$
$$\left(64\,d\sqrt{1+e^{2i(c+dx)}}\,(a\,(1+\text{Cos}[c+dx]))^{9/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+dx]))^{9/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^9\sqrt{\text{Cos}[c+dx]}\left(\frac{73\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sin}\left[\frac{dx}{2}\right]}{64\,d}+\frac{33\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Sin}\left[\frac{dx}{2}\right]}{32\,d}-\frac{9\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Sin}\left[\frac{dx}{2}\right]}{8\,d}+\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\text{Sin}\left[\frac{dx}{2}\right]}{4\,d}+\frac{73\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{64\,d}+\frac{33\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{32\,d}-\frac{9\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{8\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\text{Tan}\left[\frac{c}{2}\right]}{4\,d}\right)$$

- **Problem 263: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\text{Cos}[c+dx]^{3/2}\sqrt{a-a\,\text{Cos}[c+dx]}\,dx$$

Optimal (type 3, 129 leaves, 4 steps) :

$$-\frac{3\sqrt{a}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{\text{Cos}[c+d x]}\,\sqrt{a-a\,\text{Cos}[c+d x]}}\right]}{4 d}+\frac{3 a\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 d\sqrt{a-a\,\text{Cos}[c+d x]}}-\frac{a\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2 d\sqrt{a-a\,\text{Cos}[c+d x]}}$$

Result (type 3, 395 leaves):

$$-\frac{1}{8 d\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}}\sqrt{\text{Cos}[c+d x]}\,\sqrt{a-a\,\text{Cos}[c+d x]}$$
$$\text{Csc}\left[\frac{1}{2}(c+d x)\right]\left(3\,\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$3\,i\,\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]-$$
$$\left.4\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}+2\sqrt{2}\,\text{Cos}\left[\frac{3}{2}(c+d x)\right]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\right)$$

- **Problem 264: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d x]}\,\sqrt{a-a\,\text{Cos}[c+d x]}\,dx$$

Optimal (type 3, 85 leaves, 3 steps):

$$\frac{\sqrt{a}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{\text{Cos}[c+d x]}\,\sqrt{a-a\,\text{Cos}[c+d x]}}\right]}{d}-\frac{a\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{d\sqrt{a-a\,\text{Cos}[c+d x]}}$$

Result (type 3, 352 leaves):

$$\frac{1}{2 d\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}}\sqrt{\text{Cos}[c+d x]}\,\sqrt{a-a\,\text{Cos}[c+d x]}$$
$$\text{Csc}\left[\frac{1}{2}(c+d x)\right]\left(\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$i\,\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]-$$
$$\left.2\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\right)$$

- **Problem 265: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a-a\,\mathrm{Cos}[c+d\,x]}}{\sqrt{\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 48 leaves, 2 steps):

$$-\frac{2\sqrt{a}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}$$

Result (type 3, 243 leaves):

$$-\left(e^{\frac{i d x}{2}}\sqrt{a-a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right]+\right.\right.$$
$$\left.\mathrm{Log}\left[2\left(e^{i d x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\right]\right)$$
$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)$$

- **Problem 269: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{1-\mathrm{Cos}[c+d\,x]}\,\mathrm{Cos}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 114 leaves, 4 steps):

$$-\frac{3\,\mathrm{ArcTanh}\left[\frac{\mathrm{Sin}[c+d\,x]}{\sqrt{1-\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{3\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\sqrt{1-\mathrm{Cos}[c+d\,x]}}-\frac{\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{2\,d\sqrt{1-\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 390 leaves):

$$-\frac{1}{8\,d\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}}\sqrt{-(-1+\mathrm{Cos}[c+d\,x])\,\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]\left(3\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{i d x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\right]+\right.$$
$$3\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{d\,x}{2}\right]+i\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$3\,i\,\mathrm{Log}\left[2\left(e^{i d x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]-$$
$$\left.4\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}+2\sqrt{2}\,\mathrm{Cos}\left[\frac{3}{2}(c+d\,x)\right]\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\right)$$

## Problem 270: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}\,dx$$

Optimal (type 3, 72 leaves, 3 steps):

$$\frac{\text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}}\right]}{d}-\frac{\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{d\,\sqrt{1-\text{Cos}[c+d x]}}$$

Result (type 3, 340 leaves):

$$\frac{1}{2\,d\,\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}}\text{Csc}\left[\frac{1}{2}(c+d x)\right]\left(\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$i\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]-$$
$$\left.2\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\right)\sqrt{\text{Cos}[c+d x]\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]^2}$$

## Problem 271: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{1-\text{Cos}[c+d x]}}{\sqrt{\text{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 37 leaves, 2 steps):

$$-\frac{2\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}}\right]}{d}$$

Result (type 3, 242 leaves):

$$-\left(e^{\frac{i d x}{2}}\sqrt{1-\text{Cos}[c+d x]}\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]+\right.\right.$$
$$\left.\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\right)$$
$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)$$

## Problem 275: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d\,x]^{5/2}}{\sqrt{a-a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 185 leaves, 7 steps):

$$\frac{7\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}\right]}{4\,\sqrt{a}\,d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}+\frac{\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 246 leaves):

$$\frac{1}{8\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}\left(\frac{4\,\sqrt{\text{Cos}[c+d\,x]}\,\left(2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Cos}\left[\frac{3}{2}\,(c+d\,x)\right]\right)}{d}+1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(-7\,i\,d\,x+\right.\right.$$
$$\left.\left.7\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+8\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}\right]+7\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]$$

## Problem 276: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d\,x]^{3/2}}{\sqrt{a-a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 141 leaves, 6 steps):

$$\frac{\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 229 leaves):

$$\frac{1}{2\,\sqrt{a-a\,\text{Cos}[c+d\,x]}}\left(\frac{4\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\text{Cos}[c+d\,x]}}{d}+1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(-i\,d\,x+\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\right.\right.$$
$$\left.\left.2\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}\right]+\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]$$

## Problem 277: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\sqrt{\mathrm{Cos}[c+d x]}}{\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 107 leaves, 5 steps):

$$\frac{2\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 191 leaves):

$$-\left(i\left(-1+e^{i(c+d x)}\right)\sqrt{e^{-i(c+d x)}\left(1+e^{2 i(c+d x)}\right)}\left(-i\,d\,x+\mathrm{ArcSinh}\left[e^{i(c+d x)}\right]+\sqrt{2}\,\mathrm{Log}\left[1-e^{i(c+d x)}\right]+\mathrm{Log}\left[1+\sqrt{1+e^{2 i(c+d x)}}\right]-\sqrt{2}\,\mathrm{Log}\left[1+e^{i(c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i(c+d x)}}\right]\right)\right)\Big/\left(\sqrt{2}\,d\,\sqrt{1+e^{2 i(c+d x)}}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}\right)$$

## Problem 278: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 58 leaves, 2 steps):

$$-\frac{\sqrt{2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 137 leaves):

$$-\frac{i\left(-1+e^{i(c+d x)}\right)\sqrt{e^{-i(c+d x)}\left(1+e^{2 i(c+d x)}\right)}\left(\mathrm{Log}\left[1-e^{i(c+d x)}\right]-\mathrm{Log}\left[1+e^{i(c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i(c+d x)}}\right]\right)}{d\,\sqrt{1+e^{2 i(c+d x)}}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}$$

## Problem 279: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{1}{\mathrm{Cos}[c+d x]^{3/2}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 95 leaves, 4 steps):

$$-\frac{\sqrt{2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}\right]}{\sqrt{a}\,d}+\frac{2\,\mathrm{Sin}[c+d x]}{d\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a-a\,\mathrm{Cos}[c+d x]}}$$

Result (type 3, 194 leaves):

$$\left(e^{-\frac{1}{2}i(c+dx)}\left(2\left(1+e^{i(c+dx)}\right)\sqrt{1+e^{2i(c+dx)}}+\sqrt{2}\left(1+e^{2i(c+dx)}\right)\text{Log}\left[1-e^{i(c+dx)}\right]-\sqrt{2}\left(1+e^{2i(c+dx)}\right)\text{Log}\left[1+e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)\Big/\left(d\sqrt{1+e^{2i(c+dx)}}\sqrt{\text{Cos}[c+dx]}\sqrt{a-a\,\text{Cos}[c+dx]}\right)$$

- **Problem 280: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\text{Cos}[c+dx]^{5/2}\sqrt{a-a\,\text{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 135 leaves, 5 steps):

$$-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\sqrt{\text{Cos}[c+dx]}\sqrt{a-a\,\text{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}+\frac{2\,\text{Sin}[c+dx]}{3\,d\,\text{Cos}[c+dx]^{3/2}\sqrt{a-a\,\text{Cos}[c+dx]}}+\frac{2\,\text{Sin}[c+dx]}{3\,d\sqrt{\text{Cos}[c+dx]}\sqrt{a-a\,\text{Cos}[c+dx]}}$$

Result (type 3, 185 leaves):

$$\left(e^{-\frac{3}{2}i(c+dx)}\left(2\left(1+e^{i(c+dx)}\right)^3\sqrt{1+e^{2i(c+dx)}}+3\sqrt{2}\left(1+e^{2i(c+dx)}\right)^2\left(\text{Log}\left[1-e^{i(c+dx)}\right]-\text{Log}\left[1+e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)\Big/\left(6\,d\sqrt{1+e^{2i(c+dx)}}\,\text{Cos}[c+dx]^{3/2}\sqrt{a-a\,\text{Cos}[c+dx]}\right)$$

- **Problem 281: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{\text{Cos}[c+dx]^{7/2}\sqrt{a-a\,\text{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 173 leaves, 6 steps):

$$-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\sqrt{\text{Cos}[c+dx]}\sqrt{a-a\,\text{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}+\frac{2\,\text{Sin}[c+dx]}{5\,d\,\text{Cos}[c+dx]^{5/2}\sqrt{a-a\,\text{Cos}[c+dx]}}+\frac{2\,\text{Sin}[c+dx]}{15\,d\,\text{Cos}[c+dx]^{3/2}\sqrt{a-a\,\text{Cos}[c+dx]}}+\frac{26\,\text{Sin}[c+dx]}{15\,d\sqrt{\text{Cos}[c+dx]}\sqrt{a-a\,\text{Cos}[c+dx]}}$$

Result (type 3, 192 leaves):

$$\frac{1}{\sqrt{a-a\,\text{Cos}[c+dx]}}\left(\frac{4\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]\left(3+\text{Cos}[c+dx]+13\,\text{Cos}[c+dx]^2\right)}{15\,d\,\text{Cos}[c+dx]^{5/2}}+\frac{2\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\left(\text{Log}\left[1-e^{i(c+dx)}\right]-\text{Log}\left[1+e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)}{d\sqrt{1+e^{2i(c+dx)}}}\right)\text{Sin}\left[\frac{1}{2}(c+dx)\right]$$

## Problem 282: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d x]^{5/2}}{\sqrt{1-\text{Cos}[c+d x]}} \, dx$$

Optimal (type 3, 161 leaves, 7 steps):

$$\frac{7 \,\text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}}\right]}{4 d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}}\right]}{d}+\frac{\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 d \sqrt{1-\text{Cos}[c+d x]}}+\frac{\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2 d \sqrt{1-\text{Cos}[c+d x]}}$$

Result (type 3, 245 leaves):

$$\frac{1}{8 \sqrt{1-\text{Cos}[c+d x]}}\left(\frac{4 \sqrt{\text{Cos}[c+d x]}\,\left(2\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Cos}\left[\frac{3}{2}(c+d x)\right]\right)}{d}+1\Big/\left(d \sqrt{1+e^{2 i (c+d x)}}\right)\sqrt{2}\, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\left(-7 i d x+7\,\text{ArcSinh}\left[e^{i (c+d x)}\right]+8\sqrt{2}\,\text{Log}\left[1-e^{i (c+d x)}\right]+7\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-8\sqrt{2}\,\text{Log}\left[1+e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)\right)\text{Sin}\left[\frac{1}{2}(c+d x)\right]$$

## Problem 283: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d x]^{3/2}}{\sqrt{1-\text{Cos}[c+d x]}} \, dx$$

Optimal (type 3, 118 leaves, 6 steps):

$$\frac{\text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}}\right]}{d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{1-\text{Cos}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}}\right]}{d}+\frac{\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{d \sqrt{1-\text{Cos}[c+d x]}}$$

Result (type 3, 228 leaves):

$$\frac{1}{2 \sqrt{1-\text{Cos}[c+d x]}}\left(\frac{4\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{\text{Cos}[c+d x]}}{d}+1\Big/\left(d \sqrt{1+e^{2 i (c+d x)}}\right)\sqrt{2}\, e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\left(-i d x+\text{ArcSinh}\left[e^{i (c+d x)}\right]+2\sqrt{2}\,\text{Log}\left[1-e^{i (c+d x)}\right]+\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-2\sqrt{2}\,\text{Log}\left[1+e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)\right)\text{Sin}\left[\frac{1}{2}(c+d x)\right]$$

- **Problem 284: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Cos}[c+d\,x]}}{\sqrt{1-\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 85 leaves, 5 steps):

$$\frac{2\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{1-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}}\right]}{d}-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{1-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}}\right]}{d}$$

Result (type 3, 190 leaves):

$$-\left(i\,\left(-1+e^{i\,(c+d\,x)}\right)\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\right.$$
$$\left(-i\,d\,x+\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}\right]+\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\Bigg)\Bigg/$$
$$\left(\sqrt{2}\,d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\sqrt{1-\text{Cos}[c+d\,x]}\right)$$

- **Problem 285: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{1-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 47 leaves, 2 steps):

$$-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{1-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}}\right]}{d}$$

Result (type 3, 129 leaves):

$$-\frac{i\,e^{-i\,(c+d\,x)}\,\left(-1+e^{i\,(c+d\,x)}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1-e^{i\,(c+d\,x)}\right]-\text{Log}\left[1+e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)}{\sqrt{2}\,d\,\sqrt{-(-1+\text{Cos}[c+d\,x])\,\text{Cos}[c+d\,x]}}$$

- **Problem 286: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{1-\text{Cos}[c+d\,x]}\,\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 83 leaves, 3 steps):

$$-\frac{\sqrt{2}\,\text{ArcTanh}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{1-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,\text{Sin}[c+d\,x]}{d\,\sqrt{1-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 189 leaves):

$$\left(e^{-\frac{1}{2} i (c+d x)} \left(2 \left(1+e^{i (c+d x)}\right) \sqrt{1+e^{2 i (c+d x)}}+\sqrt{2} \left(1+e^{2 i (c+d x)}\right) \text{Log}\left[1-e^{i (c+d x)}\right]-\sqrt{2} \left(1+e^{2 i (c+d x)}\right) \text{Log}\left[1+e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right) \Big/ \left(d \sqrt{1+e^{2 i (c+d x)}} \sqrt{-(-1+\text{Cos}[c+d x]) \text{Cos}[c+d x]}\right)$$

## Problem 287: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{\sqrt{1-\text{Cos}[c+d x]} \text{Cos}[c+d x]^{5/2}} \, dx$$

Optimal (type 3, 122 leaves, 5 steps):

$$-\frac{\sqrt{2} \text{ArcTanh}\left[\frac{\text{Sin}[c+d x]}{\sqrt{2} \sqrt{1-\text{Cos}[c+d x]} \sqrt{\text{Cos}[c+d x]}}\right]}{d}+\frac{2 \text{Sin}[c+d x]}{3 d \sqrt{1-\text{Cos}[c+d x]} \text{Cos}[c+d x]^{3/2}}+\frac{2 \text{Sin}[c+d x]}{3 d \sqrt{1-\text{Cos}[c+d x]} \sqrt{\text{Cos}[c+d x]}}$$

Result (type 3, 184 leaves):

$$\left(e^{-\frac{3}{2} i (c+d x)} \left(2 \left(1+e^{i (c+d x)}\right)^3 \sqrt{1+e^{2 i (c+d x)}}+3 \sqrt{2} \left(1+e^{2 i (c+d x)}\right)^2 \left(\text{Log}\left[1-e^{i (c+d x)}\right]-\text{Log}\left[1+e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right) \Big/ \left(6 d \sqrt{1+e^{2 i (c+d x)}} \sqrt{1-\text{Cos}[c+d x]} \text{Cos}[c+d x]^{3/2}\right)$$

## Problem 288: Attempted integration timed out after 120 seconds.

$$\int \text{Cos}[c+d x]^{4/3} (a+a \text{Cos}[c+d x])^{1/3} \, dx$$

Optimal (type 6, 78 leaves, 3 steps):

$$\frac{2^{5/6} \text{AppellF1}\left[\frac{1}{2},-\frac{4}{3},\frac{1}{6},\frac{3}{2},1-\text{Cos}[c+d x],\frac{1}{2} (1-\text{Cos}[c+d x])\right] (a+a \text{Cos}[c+d x])^{1/3} \text{Sin}[c+d x]}{d (1+\text{Cos}[c+d x])^{5/6}}$$

Result (type 1, 1 leaves):

???

## Problem 289: Unable to integrate problem.

$$\int \text{Cos}[c+d x]^{4/3} (a+a \text{Cos}[c+d x])^{2/3} \, dx$$

Optimal (type 6, 79 leaves, 3 steps):

$$\frac{2\times 2^{1/6} \text{AppellF1}\left[\frac{1}{2},-\frac{4}{3},-\frac{1}{6},\frac{3}{2},1-\text{Cos}[c+d x],\frac{1}{2} (1-\text{Cos}[c+d x])\right] (a+a \text{Cos}[c+d x])^{2/3} \text{Sin}[c+d x]}{d (1+\text{Cos}[c+d x])^{7/6}}$$

Result (type 8, 27 leaves):

$$\int \text{Cos}[c+d x]^{4/3} (a+a \text{Cos}[c+d x])^{2/3} \, dx$$

### Problem 290: Unable to integrate problem.

$$\int \text{Cos}[c+d x]^{5/3} (a+a \text{Cos}[c+d x])^{2/3} \, dx$$

Optimal (type 6, 79 leaves, 3 steps):

$$\frac{2\times 2^{1/6} \text{AppellF1}\left[\frac{1}{2},-\frac{5}{3},-\frac{1}{6},\frac{3}{2},1-\text{Cos}[c+d x],\frac{1}{2} (1-\text{Cos}[c+d x])\right] (a+a \text{Cos}[c+d x])^{2/3} \text{Sin}[c+d x]}{d (1+\text{Cos}[c+d x])^{7/6}}$$

Result (type 8, 27 leaves):

$$\int \text{Cos}[c+d x]^{5/3} (a+a \text{Cos}[c+d x])^{2/3} \, dx$$

### Problem 291: Result unnecessarily involves higher level functions.

$$\int (a+a \text{Cos}[c+d x]) \text{Sec}[c+d x]^{7/2} \, dx$$

Optimal (type 4, 151 leaves, 9 steps):

$$-\frac{6 a \sqrt{\text{Cos}[c+d x]} \text{EllipticE}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{5 d}+\frac{2 a \sqrt{\text{Cos}[c+d x]} \text{EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{3 d}+$$
$$\frac{6 a \sqrt{\text{Sec}[c+d x]} \text{Sin}[c+d x]}{5 d}+\frac{2 a \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{3 d}+\frac{2 a \text{Sec}[c+d x]^{5/2} \text{Sin}[c+d x]}{5 d}$$

Result (type 5, 268 leaves):

$$\frac{1}{15 \left(d-d e^{2 i c}\right)} a (1+\text{Cos}[c+d x]) \text{Sec}\left[\frac{1}{2} (c+d x)\right]^2$$
$$\left(i \sqrt{2} e^{-i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \left(9 \left(1+e^{2 i (c+d x)}\right)+9 \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+\right.\right.$$
$$\left.5 e^{i (c+d x)} \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]\right)+$$
$$\left.\left(1-e^{2 i c}\right) \sqrt{\text{Sec}[c+d x]} (9 \text{Cos}[d x] \text{Csc}[c]+(5+3 \text{Sec}[c+d x]) \text{Tan}[c+d x])\right)$$

### Problem 292: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int (a+a \text{Cos}[c+d x]) \text{Sec}[c+d x]^{5/2} \, dx$$

Optimal (type 4, 123 leaves, 8 steps):

$$-\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a\,\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{d}+\frac{2\,a\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 255 leaves) :

$$\frac{1}{3\left(d-d\,e^{2\,i\,c}\right)}\,a\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\left(3\left(1+e^{2\,i\,(c+d\,x)}\right)+3\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\,\frac{1}{2},\,\frac{5}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)-\left(-1+e^{2\,i\,c}\right)\sqrt{\text{Sec}[c+d\,x]}\,\left(3\,\text{Cos}[d\,x]\,\text{Csc}[c]+\text{Tan}[c+d\,x]\right)\right)$$

## Problem 293: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 97 leaves, 7 steps) :

$$-\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a\,\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{d}$$

Result (type 5, 124 leaves) :

$$-\frac{1}{d}2\,i\,a\,e^{-i\,(c+d\,x)}\left(-1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\,\frac{1}{2},\,\frac{5}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\sqrt{\text{Sec}[c+d\,x]}$$

## Problem 294: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 75 leaves, 6 steps) :

$$\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{d}$$

Result (type 5, 141 leaves) :

$$-\left(2\,i\,a\left(1+e^{2\,i\,(c+d\,x)}-2\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+2\,e^{i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[\frac{1}{4},\,\frac{1}{2},\,\frac{5}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(d\,\left(1+e^{2\,i\,(c+d\,x)}\right)\,\sqrt{\text{Sec}[c+d\,x]}\right)$$

■ **Problem 295: Result unnecessarily involves higher level functions.**

$$\int\frac{a+a\,\text{Cos}[c+d\,x]}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 101 leaves, 7 steps) :

$$\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 140 leaves) :

$$\frac{1}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}a\,e^{-2\,i\,c}\,(-i\,\text{Cos}[2\,c]+\text{Sin}[2\,c])\left(6-\frac{12\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}+2\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[\frac{1}{4},\,\frac{1}{2},\,\frac{5}{4},\,-e^{2\,i\,(c+d\,x)}\right]\,\text{Sec}[c+d\,x]+2\,i\,\text{Sin}[c+d\,x]\right)$$

■ **Problem 296: Result unnecessarily involves higher level functions.**

$$\int\frac{a+a\,\text{Cos}[c+d\,x]}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 127 leaves, 8 steps) :

$$\frac{6\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,a\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 224 leaves) :

$$-\frac{1}{120\,d}\,i\,a\,e^{-3\,i\,(c+d\,x)}\,(1+\text{Cos}[c+d\,x])\left(-3-10\,e^{i\,(c+d\,x)}+33\,e^{2\,i\,(c+d\,x)}+39\,e^{4\,i\,(c+d\,x)}+10\,e^{5\,i\,(c+d\,x)}+3\,e^{6\,i\,(c+d\,x)}-72\,e^{2\,i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+40\,e^{3\,i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{\text{Sec}[c+d\,x]}$$

- **Problem 297: Result unnecessarily involves higher level functions.**

$$\int \frac{a+a\,\text{Cos}[c+d\,x]}{\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 151 leaves, 9 steps):

$$\frac{6\,a\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{10\,a\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a\,\text{Sin}[c+d\,x]}{7\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{2\,a\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{10\,a\,\text{Sin}[c+d\,x]}{21\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 198 leaves):

$$\frac{1}{420\,d}\,a\,e^{-4\,i\,(c+d\,x)}\sqrt{\text{Sec}[c+d\,x]}\;(\text{Cos}[4\,(c+d\,x)]+i\,\text{Sin}[4\,(c+d\,x)])\left(-504\,i\,\text{Cos}[c+d\,x]+504\,i\,e^{-i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-200\,i\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]+42\,\text{Sin}[c+d\,x]+130\,\text{Sin}[2\,(c+d\,x)]+42\,\text{Sin}[3\,(c+d\,x)]+15\,\text{Sin}[4\,(c+d\,x)]\right)$$

- **Problem 298: Result unnecessarily involves higher level functions.**

$$\int (a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 161 leaves, 9 steps):

$$-\frac{16\,a^2\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{4\,a^2\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{16\,a^2\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{5\,d}+\frac{4\,a^2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,a^2\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 261 leaves):

$$\frac{1}{30\,d}a^2\,(1+\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4$$
$$\left(-1\Big/\left(\left(-1+e^{2\,i\,c}\right)2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\left(12\,\left(1+e^{2\,i\,(c+d\,x)}\right)+12\,\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+5\,e^{i\,(c+d\,x)}\,\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+\sqrt{\text{Sec}[c+d\,x]}\,(24\,\text{Cos}[d\,x]\,\text{Csc}[c]+(10+3\,\text{Sec}[c+d\,x])\,\text{Tan}[c+d\,x])\right)$$

## Problem 299: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 131 leaves, 8 steps):

$$-\frac{4\,a^2\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{8\,a^2\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{4\,a^2\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}+\frac{2\,a^2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 250 leaves):

$$\frac{1}{6\,d}a^2\,(1+\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4$$
$$\left(-1\Big/\left(\left(-1+e^{2\,i\,c}\right)2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\left(3\,\left(1+e^{2\,i\,(c+d\,x)}\right)+3\,\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+2\,e^{i\,(c+d\,x)}\,\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+\sqrt{\text{Sec}[c+d\,x]}\,(6\,\text{Cos}[d\,x]\,\text{Csc}[c]+\text{Tan}[c+d\,x])\right)$$

## Problem 301: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 107 leaves, 7 steps):

$$\frac{4\,a^2\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{8\,a^2\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a^2\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 127 leaves):

$$\frac{1}{3\, d\, \sqrt{\operatorname{Sec}[c+d\, x]}} a^2 \left(\frac{24\, i\, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\, i\, (c+d\, x)}\right]}{\sqrt{1+e^{2\, i\, (c+d\, x)}}} + 2 \left(-6\, i - 4\, i\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\, \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2\, i\, (c+d\, x)}\right] \operatorname{Sec}[c+d\, x] + \operatorname{Sin}[c+d\, x]\right)\right)$$

## Problem 302: Result unnecessarily involves higher level functions.

$$\int \frac{(a+a\, \operatorname{Cos}[c+d\, x])^2}{\sqrt{\operatorname{Sec}[c+d\, x]}}\, dx$$

Optimal (type 4, 135 leaves, 8 steps):

$$\frac{16\, a^2 \sqrt{\operatorname{Cos}[c+d\, x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\operatorname{Sec}[c+d\, x]}}{5\, d} + \frac{4\, a^2 \sqrt{\operatorname{Cos}[c+d\, x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\operatorname{Sec}[c+d\, x]}}{3\, d} + \frac{2\, a^2 \operatorname{Sin}[c+d\, x]}{5\, d\, \operatorname{Sec}[c+d\, x]^{3/2}} + \frac{4\, a^2 \operatorname{Sin}[c+d\, x]}{3\, d\, \sqrt{\operatorname{Sec}[c+d\, x]}}$$

Result (type 5, 136 leaves):

$$\frac{1}{30\, d\, \sqrt{\operatorname{Sec}[c+d\, x]}} a^2 \left(-96\, i + \frac{192\, i\, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\, i\, (c+d\, x)}\right]}{\sqrt{1+e^{2\, i\, (c+d\, x)}}} - 40\, i\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\, \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2\, i\, (c+d\, x)}\right] \operatorname{Sec}[c+d\, x] + 40 \operatorname{Sin}[c+d\, x] + 6 \operatorname{Sin}[2 (c+d\, x)]\right)$$

## Problem 303: Result unnecessarily involves higher level functions.

$$\int \frac{(a+a\, \operatorname{Cos}[c+d\, x])^2}{\operatorname{Sec}[c+d\, x]^{3/2}}\, dx$$

Optimal (type 4, 161 leaves, 9 steps):

$$\frac{12\, a^2 \sqrt{\operatorname{Cos}[c+d\, x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\operatorname{Sec}[c+d\, x]}}{5\, d} + \frac{8\, a^2 \sqrt{\operatorname{Cos}[c+d\, x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\operatorname{Sec}[c+d\, x]}}{7\, d} + \frac{2\, a^2 \operatorname{Sin}[c+d\, x]}{7\, d\, \operatorname{Sec}[c+d\, x]^{5/2}} + \frac{4\, a^2 \operatorname{Sin}[c+d\, x]}{5\, d\, \operatorname{Sec}[c+d\, x]^{3/2}} + \frac{8\, a^2 \operatorname{Sin}[c+d\, x]}{7\, d\, \sqrt{\operatorname{Sec}[c+d\, x]}}$$

Result (type 5, 149 leaves):

$$\frac{1}{140\,d\,\sqrt{\text{Sec}[c+d\,x]}}\,a^2\left(\frac{672\,i\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}+2\left(-168\,i-80\,i\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\,\text{Sec}[c+d\,x]+85\,\text{Sin}[c+d\,x]+28\,\text{Sin}[2\,(c+d\,x)]+5\,\text{Sin}[3\,(c+d\,x)]\right)\right)$$

## Problem 304: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 187 leaves, 17 steps):

$$-\frac{28\,a^3\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{52\,a^3\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{28\,a^3\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{52\,a^3\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{6\,a^3\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a^3\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 279 leaves):

$$\frac{1}{420\,d}\,a^3\,(1+\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^6\left(-\frac{1}{-1+e^{2\,i\,c}}2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\left(147\,\left(1+e^{2\,i\,(c+d\,x)}\right)+147\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+65\,e^{i\,(c+d\,x)}\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+\sqrt{\text{Sec}[c+d\,x]}\,\left(294\,\text{Cos}[d\,x]\,\text{Csc}[c]+(80+63\,\text{Cos}[c+d\,x]+65\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)$$

## Problem 305: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 157 leaves, 15 steps):

$$-\frac{36\,a^3\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{4\,a^3\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{36\,a^3\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a^3\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{d}+\frac{2\,a^3\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 259 leaves):

$$\frac{1}{20\,d}a^3\,(1+\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^6$$
$$\left(-1\Big/\left(-1+e^{2\,i\,c}\right)2\,i\,\sqrt{2}\;e^{-i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\left(9\left(1+e^{2\,i\,(c+d\,x)}\right)+9\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+\right.\right.$$
$$\left.5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+$$
$$\left.\sqrt{\text{Sec}[c+d\,x]}\;(18\,\text{Cos}[d\,x]\,\text{Csc}[c]+(5+\text{Sec}[c+d\,x])\,\text{Tan}[c+d\,x])\right)$$

## Problem 306: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 131 leaves, 13 steps):

$$-\frac{4\,a^3\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{20\,a^3\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{6\,a^3\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d}+\frac{2\,a^3\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 157 leaves):

$$-\frac{1}{3\,d}i\,a^3\,\text{Sec}[c+d\,x]^{3/2}\left(-6-6\,\text{Cos}[2\,(c+d\,x)]+6\,e^{-2\,i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)^{3/2}\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+\right.$$
$$\left.20\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]+2\,i\,\text{Sin}[c+d\,x]+9\,i\,\text{Sin}[2\,(c+d\,x)]\right)$$

## Problem 307: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 131 leaves, 13 steps):

$$\frac{4\,a^3\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{d}+$$
$$\frac{20\,a^3\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a^3\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{2\,a^3\,\sqrt{\mathrm{Sec}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{d}$$

Result (type 5, 135 leaves) :

$$\frac{1}{3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}a^3\left(\frac{24\,i\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}+\right.$$
$$\left.2\left(-6\,i-10\,i\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[\frac{1}{4},\,\frac{1}{2},\,\frac{5}{4},\,-e^{2\,i\,(c+d\,x)}\right]\mathrm{Sec}[c+d\,x]+\mathrm{Sin}[c+d\,x]+3\,\mathrm{Tan}[c+d\,x]\right)\right)$$

## Problem 308: Result unnecessarily involves higher level functions.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^3\,\sqrt{\mathrm{Sec}[c+d\,x]}\ dx$$

Optimal (type 4, 131 leaves, 13 steps) :

$$\frac{36\,a^3\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{5\,d}+$$
$$\frac{4\,a^3\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{d}+\frac{2\,a^3\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{2\,a^3\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 5, 137 leaves) :

$$\frac{1}{10\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}a^3\left(\frac{144\,i\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}+\right.$$
$$\left.2\left(-36\,i-20\,i\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[\frac{1}{4},\,\frac{1}{2},\,\frac{5}{4},\,-e^{2\,i\,(c+d\,x)}\right]\mathrm{Sec}[c+d\,x]+10\,\mathrm{Sin}[c+d\,x]+\mathrm{Sin}[2\,(c+d\,x)]\right)\right)$$

## Problem 309: Result unnecessarily involves higher level functions.

$$\int \frac{(a+a\,\mathrm{Cos}[c+d\,x])^3}{\sqrt{\mathrm{Sec}[c+d\,x]}}\ dx$$

Optimal (type 4, 161 leaves, 15 steps) :

$$\frac{28\, a^3 \sqrt{\text{Cos}[c+d\, x]}\; \text{EllipticE}\left[\frac{1}{2}(c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{5\, d} + \frac{52\, a^3 \sqrt{\text{Cos}[c+d\, x]}\; \text{EllipticF}\left[\frac{1}{2}(c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{21\, d} + \frac{2\, a^3\, \text{Sin}[c+d\, x]}{7\, d\, \text{Sec}[c+d\, x]^{5/2}} + \frac{6\, a^3\, \text{Sin}[c+d\, x]}{5\, d\, \text{Sec}[c+d\, x]^{3/2}} + \frac{52\, a^3\, \text{Sin}[c+d\, x]}{21\, d \sqrt{\text{Sec}[c+d\, x]}}$$

Result (type 5, 146 leaves) :

$$\frac{1}{420\, d \sqrt{\text{Sec}[c+d\, x]}} a^3 \left(-2352\, i + \frac{4704\, i\, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\, i\, (c+d\, x)}\right]}{\sqrt{1+e^{2\, i\, (c+d\, x)}}} - 1040\, i \sqrt{1+e^{2\, i\, (c+d\, x)}}\; \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2\, i\, (c+d\, x)}\right] \text{Sec}[c+d\, x] + 1070\, \text{Sin}[c+d\, x] + 252\, \text{Sin}[2\, (c+d\, x)] + 30\, \text{Sin}[3\, (c+d\, x)]\right)$$

## Problem 310: Result unnecessarily involves higher level functions.

$$\int \frac{(a+a\, \text{Cos}[c+d\, x])^3}{\text{Sec}[c+d\, x]^{3/2}}\, dx$$

Optimal (type 4, 187 leaves, 17 steps) :

$$\frac{68\, a^3 \sqrt{\text{Cos}[c+d\, x]}\; \text{EllipticE}\left[\frac{1}{2}(c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{15\, d} + \frac{44\, a^3 \sqrt{\text{Cos}[c+d\, x]}\; \text{EllipticF}\left[\frac{1}{2}(c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{21\, d} + \frac{2\, a^3\, \text{Sin}[c+d\, x]}{9\, d\, \text{Sec}[c+d\, x]^{7/2}} + \frac{6\, a^3\, \text{Sin}[c+d\, x]}{7\, d\, \text{Sec}[c+d\, x]^{5/2}} + \frac{68\, a^3\, \text{Sin}[c+d\, x]}{45\, d\, \text{Sec}[c+d\, x]^{3/2}} + \frac{44\, a^3\, \text{Sin}[c+d\, x]}{21\, d \sqrt{\text{Sec}[c+d\, x]}}$$

Result (type 5, 156 leaves) :

$$\frac{1}{2520\, d \sqrt{\text{Sec}[c+d\, x]}} a^3 \left(-11\,424\, i + \frac{22\,848\, i\, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\, i\, (c+d\, x)}\right]}{\sqrt{1+e^{2\, i\, (c+d\, x)}}} - 5280\, i \sqrt{1+e^{2\, i\, (c+d\, x)}}\; \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2\, i\, (c+d\, x)}\right] \text{Sec}[c+d\, x] + 5820\, \text{Sin}[c+d\, x] + 2044\, \text{Sin}[2\, (c+d\, x)] + 540\, \text{Sin}[3\, (c+d\, x)] + 70\, \text{Sin}[4\, (c+d\, x)]\right)$$

## Problem 311: Result unnecessarily involves higher level functions.

$$\int (a+a\, \text{Cos}[c+d\, x])^4\, \text{Sec}[c+d\, x]^{9/2}\, dx$$

Optimal (type 4, 187 leaves, 19 steps):

$$-\frac{64 a^4 \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\operatorname{Sec}[c+d x]}}{5 d}+\frac{136 a^4 \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\operatorname{Sec}[c+d x]}}{21 d}+\frac{64 a^4 \sqrt{\operatorname{Sec}[c+d x]}\ \operatorname{Sin}[c+d x]}{5 d}+\frac{94 a^4 \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{21 d}+\frac{8 a^4 \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{5 d}+\frac{2 a^4 \operatorname{Sec}[c+d x]^{7/2} \operatorname{Sin}[c+d x]}{7 d}$$

Result (type 5, 271 leaves):

$$\frac{1}{840 d} a^4 (1+\operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^8 \left(-\frac{1}{-1+e^{2 i c}} 4 i \sqrt{2}\, e^{-i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \left(168 \left(1+e^{2 i (c+d x)}\right)+168 \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}}\ \operatorname{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+85 e^{i (c+d x)} \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}}\ \operatorname{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]\right)+\sqrt{\operatorname{Sec}[c+d x]} \left(672 \operatorname{Cos}[d x] \operatorname{Csc}[c]+\left(235+84 \operatorname{Sec}[c+d x]+15 \operatorname{Sec}[c+d x]^2\right) \operatorname{Tan}[c+d x]\right)\right)$$

## Problem 312: Result unnecessarily involves higher level functions.

$$\int (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}[c+d x]^{7/2}\, dx$$

Optimal (type 4, 161 leaves, 17 steps):

$$-\frac{56 a^4 \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\operatorname{Sec}[c+d x]}}{5 d}+\frac{32 a^4 \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\operatorname{Sec}[c+d x]}}{3 d}+\frac{66 a^4 \sqrt{\operatorname{Sec}[c+d x]}\ \operatorname{Sin}[c+d x]}{5 d}+\frac{8 a^4 \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{3 d}+\frac{2 a^4 \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{5 d}$$

Result (type 5, 278 leaves):

$$\frac{1}{240\,d}a^4 (1+\text{Cos}[c+d x])^4 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^8$$

$$\left(-\frac{1}{-1+e^{2 i c}}8 i \sqrt{2}\, e^{-i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \left(21 \left(1+e^{2 i (c+d x)}\right)+21 \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}}\, \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+\right.\right.$$

$$\left.20\, e^{i (c+d x)} \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}}\, \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]\right)+$$

$$\left.\sqrt{\text{Sec}[c+d x]}\, (-3 (-61+5 \text{Cos}[2 c]) \text{Cos}[d x] \text{Csc}[c]+30 \text{Cos}[c] \text{Sin}[d x]+2 (20+3 \text{Sec}[c+d x]) \text{Tan}[c+d x])\right)$$

## Problem 314: Result unnecessarily involves higher level functions.

$$\int (a+a \text{Cos}[c+d x])^4 \text{Sec}[c+d x]^{3/2}\, dx$$

Optimal (type 4, 159 leaves, 16 steps):

$$\frac{56 a^4 \sqrt{\text{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{5 d}+$$

$$\frac{32 a^4 \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{3 d}+\frac{2 a^4 \text{Sin}[c+d x]}{5 d \text{Sec}[c+d x]^{3/2}}+\frac{8 a^4 \text{Sin}[c+d x]}{3 d \sqrt{\text{Sec}[c+d x]}}+\frac{2 a^4 \sqrt{\text{Sec}[c+d x]}\, \text{Sin}[c+d x]}{d}$$

Result (type 5, 150 leaves):

$$\frac{1}{30\, d \sqrt{\text{Sec}[c+d x]}}$$

$$a^4 \left(-336 i+\frac{672 i\, \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]}{\sqrt{1+e^{2 i (c+d x)}}}-320 i \sqrt{1+e^{2 i (c+d x)}}\, \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right] \text{Sec}[c+d x]+\right.$$

$$\left.80 \text{Sin}[c+d x]+3 \text{Sec}[c+d x] \text{Sin}[3 (c+d x)]+63 \text{Tan}[c+d x]\right)$$

## Problem 315: Result unnecessarily involves higher level functions.

$$\int (a+a \text{Cos}[c+d x])^4 \sqrt{\text{Sec}[c+d x]}\, dx$$

Optimal (type 4, 161 leaves, 17 steps):

$$\frac{64\,a^4\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+$$
$$\frac{136\,a^4\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a^4\,\text{Sin}[c+d\,x]}{7\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{8\,a^4\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{94\,a^4\,\text{Sin}[c+d\,x]}{21\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 146 leaves):

$$\frac{1}{420\,d\sqrt{\text{Sec}[c+d\,x]}}a^4\left(-5376\,i+\frac{10752\,i\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}-\right.$$
$$\left.2720\,i\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\text{Sec}[c+d\,x]+1910\,\text{Sin}[c+d\,x]+336\,\text{Sin}[2\,(c+d\,x)]+30\,\text{Sin}[3\,(c+d\,x)]\right)$$

## Problem 316: Result unnecessarily involves higher level functions.

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^4}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 187 leaves, 19 steps):

$$\frac{152\,a^4\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{15\,d}+\frac{32\,a^4\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{7\,d}+$$
$$\frac{2\,a^4\,\text{Sin}[c+d\,x]}{9\,d\,\text{Sec}[c+d\,x]^{7/2}}+\frac{8\,a^4\,\text{Sin}[c+d\,x]}{7\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{122\,a^4\,\text{Sin}[c+d\,x]}{45\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{32\,a^4\,\text{Sin}[c+d\,x]}{7\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 156 leaves):

$$\frac{1}{2520\,d\sqrt{\text{Sec}[c+d\,x]}}$$
$$a^4\left(-25536\,i+\frac{51072\,i\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}-11520\,i\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right.$$
$$\left.\text{Sec}[c+d\,x]+12240\,\text{Sin}[c+d\,x]+3556\,\text{Sin}[2\,(c+d\,x)]+720\,\text{Sin}[3\,(c+d\,x)]+70\,\text{Sin}[4\,(c+d\,x)]\right)$$

## Problem 317: Result unnecessarily involves higher level functions.

$$\int\frac{\text{Sec}[c+d\,x]^{5/2}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 164 leaves, 9 steps):

$$\frac{3\sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{a d}+\frac{5\sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{3 a d}-\frac{3\sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{a d}+\frac{5\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3 a d}-\frac{\text{Sec}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{d\,(a+a\,\text{Sec}[c+d x])}$$

Result (type 5, 285 leaves):

$$\frac{1}{3 a d\,(1+\text{Cos}[c+d x])}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\left(\frac{1}{-1+e^{2 i c}}2 i\sqrt{2}\,e^{-i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2 i(c+d x)}}}\left(9\left(1+e^{2 i(c+d x)}\right)+9\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i(c+d x)}\right]-5\,e^{i(c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i(c+d x)}\right]\right)-\sqrt{\text{Sec}[c+d x]}\left(18\,\text{Cos}[d x]\,\text{Csc}[c]+\text{Sec}[c+d x]\left(-5\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Sin}\left[\frac{3}{2}(c+d x)\right]+\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\right)$$

- **Problem 318: Result unnecessarily involves higher level functions.**

$$\int\frac{\text{Sec}[c+d x]^{3/2}}{a+a\,\text{Cos}[c+d x]}\,dx$$

Optimal (type 4, 136 leaves, 8 steps):

$$-\frac{3\sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{a d}-\frac{\sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{a d}+\frac{3\sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{a d}-\frac{\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{d\,(a+a\,\text{Sec}[c+d x])}$$

Result (type 5, 256 leaves):

$$\frac{1}{a\,(1+\text{Cos}[c+d x])}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\left(-1/\left(d\left(-1+e^{2 i c}\right)\right)2 i\sqrt{2}\,e^{-i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2 i(c+d x)}}}\left(3\left(1+e^{2 i(c+d x)}\right)+3\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i(c+d x)}\right]-e^{i(c+d x)}\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i(c+d x)}}\ \text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i(c+d x)}\right]\right)+\frac{\sqrt{\text{Sec}[c+d x]}\left(6\,\text{Cos}[d x]\,\text{Csc}[c]-2\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)}{d}\right)$$

## Problem 319: Result unnecessarily involves higher level functions.

$$\int \frac{\sqrt{\text{Sec}[c+d x]}}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 4, 110 leaves, 7 steps):

$$\frac{\sqrt{\text{Cos}[c+d x]} \, \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{a d}+\frac{\sqrt{\text{Cos}[c+d x]} \, \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{a d}-\frac{\sqrt{\text{Sec}[c+d x]} \, \text{Sin}[c+d x]}{d (a+a \text{Sec}[c+d x])}$$

Result (type 5, 180 leaves):

$$-\frac{1}{a d \left(1+e^{i (c+d x)}\right)^3} 4 i \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \left(1+e^{2 i (c+d x)}-\left(1+e^{i (c+d x)}\right) \sqrt{1+e^{2 i (c+d x)}} \, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+e^{i (c+d x)} \left(1+e^{i (c+d x)}\right) \sqrt{1+e^{2 i (c+d x)}} \, \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2 i (c+d x)}\right]\right) \sqrt{\text{Sec}[c+d x]}$$

## Problem 320: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a \text{Cos}[c+d x]) \sqrt{\text{Sec}[c+d x]}} \, dx$$

Optimal (type 4, 110 leaves, 7 steps):

$$-\frac{\sqrt{\text{Cos}[c+d x]} \, \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{a d}+\frac{\sqrt{\text{Cos}[c+d x]} \, \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{a d}+\frac{\sqrt{\text{Sec}[c+d x]} \, \text{Sin}[c+d x]}{d (a+a \text{Sec}[c+d x])}$$

Result (type 5, 181 leaves):

$$-\frac{1}{a d \left(1+e^{i (c+d x)}\right)^3} 4 i \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \left(-1-e^{2 i (c+d x)}+\left(1+e^{i (c+d x)}\right) \sqrt{1+e^{2 i (c+d x)}} \, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+e^{i (c+d x)} \left(1+e^{i (c+d x)}\right) \sqrt{1+e^{2 i (c+d x)}} \, \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2 i (c+d x)}\right]\right) \sqrt{\text{Sec}[c+d x]}$$

## Problem 321: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+a \text{Cos}[c+d x]) \text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 112 leaves, 7 steps):

$$\frac{3 \sqrt{\text{Cos}[c+d x]} \, \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{a d}-\frac{\sqrt{\text{Cos}[c+d x]} \, \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{a d}-\frac{\sqrt{\text{Sec}[c+d x]} \, \text{Sin}[c+d x]}{d (a+a \text{Sec}[c+d x])}$$

Result (type 5, 311 leaves):

$$\frac{1}{a\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(1\Big/\left(d\left(-1+e^{2\,i\,c}\right)\right)2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\left(3\left(1+e^{2\,i\,(c+d\,x)}\right)+3\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-1\,/\,(2\,d)\left(\text{Cos}\left[\frac{1}{2}\,(c-d\,x)\right]+2\,\text{Cos}\left[\frac{1}{2}\,(3\,c+d\,x)\right]+2\,\text{Cos}\left[\frac{1}{2}\,(c+3\,d\,x)\right]+\text{Cos}\left[\frac{1}{2}\,(5\,c+3\,d\,x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{\text{Sec}[c+d\,x]}\right)$$

- **Problem 322: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 140 leaves, 8 steps):

$$-\frac{3\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a\,d}+\frac{5\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,d}+\frac{5\,\text{Sin}[c+d\,x]}{3\,a\,d\sqrt{\text{Sec}[c+d\,x]}}-\frac{\text{Sin}[c+d\,x]}{d\sqrt{\text{Sec}[c+d\,x]}\,(a+a\,\text{Sec}[c+d\,x])}$$

Result (type 5, 374 leaves):

$$-\left(2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(9\left(1+e^{2\,i\,(c+d\,x)}\right)+9\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right)\Big/\left(3\,d\left(-1+e^{2\,i\,c}\right)(a+a\,\text{Cos}[c+d\,x])\right)+\frac{1}{a+a\,\text{Cos}[c+d\,x]}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\text{Sec}[c+d\,x]}\left(\frac{(2+\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{d}+\frac{2\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}-\frac{4\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}+\frac{2\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d}-\frac{2\,\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

## Problem 323: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 168 leaves, 9 steps):

$$\frac{21\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,a\,d}-\frac{5\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,d}+\frac{7\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Sec}[c+d\,x]^{3/2}}-\frac{5\,\text{Sin}[c+d\,x]}{3\,a\,d\sqrt{\text{Sec}[c+d\,x]}}-\frac{\text{Sin}[c+d\,x]}{d\,\text{Sec}[c+d\,x]^{3/2}\,(a+a\,\text{Sec}[c+d\,x])}$$

Result (type 5, 341 leaves):

$$\frac{1}{60\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\left(\frac{1}{-1+e^{2\,i\,c}}8\,i\sqrt{2}\,e^{-i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\left(63\left(1+e^{2\,i\,(c+d\,x)}\right)+63\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+25\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-\sqrt{\text{Sec}[c+d\,x]}\left(18\,(17+11\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}[c]+4\left(10\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]-3\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]-30\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{d\,x}{2}\right]-99\,\text{Cos}[c]\,\text{Sin}[d\,x]+10\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]-3\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]-30\,\text{Tan}\left[\frac{c}{2}\right]\right)\right)\right)$$

## Problem 324: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 202 leaves, 10 steps):

$$\frac{7\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}+\frac{10\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}-\frac{7\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{a^2\,d}+\frac{10\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,d}-\frac{7\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Sec}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 443 leaves):

$$\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}\,7\,\sqrt{2}\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\,\text{Sec}\left[\frac{c}{2}\right]+$$

$$\frac{20\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}\left[\frac{c}{2}\right]\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Sec}[c+d\,x]}\,\left(-\frac{14\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]}{d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\left(-3\,\text{Sin}\left[\frac{c}{2}\right]+5\,\text{Sin}\left[\frac{3\,c}{2}\right]\right)}{3\,d}+\right.$$

$$\left.\frac{32\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\frac{8\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{3\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 325: Result unnecessarily involves higher level functions.**

$$\int\frac{\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 176 leaves, 9 steps):

$$-\frac{4\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}-\frac{5\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}+$$

$$\frac{4\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{a^2\,d}-\frac{5\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Sec}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 259 leaves):

$$-\frac{1}{6\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}$$

$$e^{-i\,(2\,c+d\,x)}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\left(12\,i\,e^{-2\,i\,(c+d\,x)}\,\left(1+e^{i\,(c+d\,x)}\right)^3\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+\right.$$

$$40\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)-$$

$$\left.i\,(29+50\,\text{Cos}[c+d\,x]+17\,\text{Cos}[2\,(c+d\,x)]-12\,i\,\text{Sin}[c+d\,x]-7\,i\,\text{Sin}[2\,(c+d\,x)])\right)\,\left(\text{Cos}\left[\frac{1}{2}\,(3\,c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}\,(3\,c+d\,x)\right]\right)$$

- **Problem 326: Result unnecessarily involves higher level functions.**

$$\int\frac{\sqrt{\text{Sec}[c+d\,x]}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 149 leaves, 8 steps):

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}+\frac{2\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}-\frac{\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Sec}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]^{3/2}\ \text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 249 leaves):

$$\frac{1}{6\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,e^{-i\,(2c+d\,x)}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{\text{Sec}[c+d\,x]}\left(3\,i\,e^{-2\,i\,(c+d\,x)}\left(1+e^{i\,(c+d\,x)}\right)^3\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+16\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)-i\,(5+14\,\text{Cos}[c+d\,x]+5\,\text{Cos}[2\,(c+d\,x)]-i\,\text{Sin}[2\,(c+d\,x)])\right)\left(\text{Cos}\left[\frac{1}{2}(3c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}(3c+d\,x)\right]\right)$$

## Problem 328: Result unnecessarily involves higher level functions.

$$\int\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 149 leaves, 8 steps):

$$-\frac{\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}+\frac{2\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}+\frac{\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Sec}[c+d\,x])}-\frac{\text{Sec}[c+d\,x]^{3/2}\ \text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 247 leaves):

$$\frac{1}{6\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,e^{-i\,(2c+d\,x)}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{\text{Sec}[c+d\,x]}\left(16\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)-i\left(-7-10\,\text{Cos}[c+d\,x]-7\,\text{Cos}[2\,(c+d\,x)]+3\,e^{-2\,i\,(c+d\,x)}\left(1+e^{i\,(c+d\,x)}\right)^3\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-i\,\text{Sin}[2\,(c+d\,x)]\right)\right)\left(\text{Cos}\left[\frac{1}{2}(3c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}(3c+d\,x)\right]\right)$$

## Problem 329: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 152 leaves, 8 steps):

$$\frac{4\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}-\frac{5\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}-\frac{5\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Sec}[c+d\,x])}-\frac{\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 231 leaves):

$$-\frac{1}{12\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,i\,e^{-3\,i\,(c+d\,x)}\left(1+e^{i\,(c+d\,x)}\right)\left(9+20\,e^{i\,(c+d\,x)}+25\,e^{2\,i\,(c+d\,x)}+23\,e^{3\,i\,(c+d\,x)}+16\,e^{4\,i\,(c+d\,x)}+3\,e^{5\,i\,(c+d\,x)}-5\,i\,e^{i\,(c+d\,x)}\left(1+e^{i\,(c+d\,x)}\right)^3\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]-12\left(1+e^{i\,(c+d\,x)}\right)^3\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\sqrt{\text{Sec}[c+d\,x]}$$

## Problem 330: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 178 leaves, 9 steps):

$$-\frac{7\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}+\frac{10\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}+\frac{10\,\text{Sin}[c+d\,x]}{3\,a^2\,d\sqrt{\text{Sec}[c+d\,x]}}-\frac{7\,\text{Sin}[c+d\,x]}{3\,a^2\,d\sqrt{\text{Sec}[c+d\,x]}\,(1+\text{Sec}[c+d\,x])}-\frac{\text{Sin}[c+d\,x]}{3\,d\sqrt{\text{Sec}[c+d\,x]}\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 270 leaves):

$$\frac{1}{3\,a^2\,(1+\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\left(\frac{40\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{d}+1\Big/\left(d\left(1+e^{i\,(c+d\,x)}\right)^3\right)2\,i\,e^{-2\,i\,(c+d\,x)}\left(1+33\,e^{i\,(c+d\,x)}+73\,e^{2\,i\,(c+d\,x)}+87\,e^{3\,i\,(c+d\,x)}+81\,e^{4\,i\,(c+d\,x)}+53\,e^{5\,i\,(c+d\,x)}+9\,e^{6\,i\,(c+d\,x)}-e^{7\,i\,(c+d\,x)}-42\,e^{i\,(c+d\,x)}\left(1+e^{i\,(c+d\,x)}\right)^3\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\sqrt{\text{Sec}[c+d\,x]}\right)$$

## Problem 331: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 200 leaves, 10 steps):

$$\frac{56\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,a^2\,d}-\frac{5\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}+\frac{56\,\text{Sin}[c+d\,x]}{15\,a^2\,d\,\text{Sec}[c+d\,x]^{3/2}}-\frac{5\,\text{Sin}[c+d\,x]}{a^2\,d\sqrt{\text{Sec}[c+d\,x]}}-\frac{3\,\text{Sin}[c+d\,x]}{a^2\,d\,\text{Sec}[c+d\,x]^{3/2}(1+\text{Sec}[c+d\,x])}-\frac{\text{Sin}[c+d\,x]}{3\,d\,\text{Sec}[c+d\,x]^{3/2}(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 298 leaves):

$$-\frac{1}{15\,a^2\,d\left(1+e^{i(c+d\,x)}\right)^7}4\,i\,e^{-i(c+d\,x)}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\left(-3+11\,e^{i(c+d\,x)}+504\,e^{2i(c+d\,x)}+1156\,e^{3i(c+d\,x)}+1378\,e^{4i(c+d\,x)}+1310\,e^{5i(c+d\,x)}+860\,e^{6i(c+d\,x)}+168\,e^{7i(c+d\,x)}-11\,e^{8i(c+d\,x)}+3\,e^{9i(c+d\,x)}-300\,i\,e^{3i(c+d\,x)}\left(1+e^{i(c+d\,x)}\right)^3\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]-672\,e^{2i(c+d\,x)}\left(1+e^{i(c+d\,x)}\right)^3\sqrt{1+e^{2i(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+d\,x)}\right]\right)\sqrt{\text{Sec}[c+d\,x]}$$

## Problem 332: Result unnecessarily involves higher level functions.

$$\int \frac{\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 221 leaves, 10 steps):

$$-\frac{49\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}-\frac{13\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}+\frac{49\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{10\,a^3\,d}-\frac{\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Sec}[c+d\,x])^3}-\frac{8\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Sec}[c+d\,x])^2}-\frac{13\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,d\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)}$$

Result (type 5, 363 leaves):

$$\frac{1}{15\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\,2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^6$$
$$\left(-\frac{1}{-1+e^{2\,i\,c}}2\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\left(147\,\left(1+e^{2\,i\,(c+d\,x)}\right)+147\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-\right.\right.$$
$$\left.65\,e^{i\,(c+d\,x)}\,\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+$$
$$\frac{1}{32}\left(1284\,\text{Cos}\left[\frac{1}{2}\,(c-d\,x)\right]+921\,\text{Cos}\left[\frac{1}{2}\,(3\,c+d\,x)\right]+1243\,\text{Cos}\left[\frac{1}{2}\,(c+3\,d\,x)\right]+374\,\text{Cos}\left[\frac{1}{2}\,(5\,c+3\,d\,x)\right]+670\,\text{Cos}\left[\frac{1}{2}\,(3\,c+5\,d\,x)\right]+\right.$$
$$\left.\left.65\,\text{Cos}\left[\frac{1}{2}\,(7\,c+5\,d\,x)\right]+147\,\text{Cos}\left[\frac{1}{2}\,(5\,c+7\,d\,x)\right]\right)\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5\,\sqrt{\text{Sec}[c+d\,x]}\right)$$

## Problem 333: Result unnecessarily involves higher level functions.

$$\int\frac{\sqrt{\text{Sec}[c+d\,x]}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 195 leaves, 9 steps):

$$\frac{9\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{2\,a^3\,d}-$$
$$\frac{\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Sec}[c+d\,x])^3}-\frac{2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d\,(a+a\,\text{Sec}[c+d\,x])^2}-\frac{9\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)}$$

Result (type 5, 281 leaves):

$$\frac{1}{40\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}$$
$$e^{-i\,(2\,c+d\,x)}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\left(9\,i\,e^{-3\,i\,(c+d\,x)}\,\left(1+e^{i\,(c+d\,x)}\right)^5\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+\right.$$
$$160\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)-$$
$$\left.2\,i\,(34+69\,\text{Cos}[c+d\,x]+34\,\text{Cos}[2\,(c+d\,x)]+7\,\text{Cos}[3\,(c+d\,x)]-2\,i\,\text{Sin}[c+d\,x]-6\,i\,\text{Sin}[2\,(c+d\,x)]-2\,i\,\text{Sin}[3\,(c+d\,x)])\right)$$
$$\left(\text{Cos}\left[\frac{1}{2}\,(3\,c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}\,(3\,c+d\,x)\right]\right)$$

## Problem 334: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 195 leaves, 9 steps):

$$\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{6\,a^3\,d}-\frac{\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^3}-\frac{4\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^2}+\frac{\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{6\,d\,(a^3+a^3\,\mathrm{Sec}[c+d\,x])}$$

Result (type 5, 363 leaves):

$$\frac{1}{15\,a^3\,d\,(1+\mathrm{Cos}[c+d\,x])^3}\,2\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^6\left(\frac{1}{-1+e^{2\,i\,c}}2\,i\sqrt{2}\,e^{-i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\left(3\left(1+e^{2\,i\,(c+d\,x)}\right)+3\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]-5\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-\frac{1}{32}\left(36\,\mathrm{Cos}\left[\frac{1}{2}(c-d\,x)\right]+9\,\mathrm{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]+7\,\mathrm{Cos}\left[\frac{1}{2}(c+3\,d\,x)\right]+26\,\mathrm{Cos}\left[\frac{1}{2}(5\,c+3\,d\,x)\right]+10\,\mathrm{Cos}\left[\frac{1}{2}(3\,c+5\,d\,x)\right]+5\,\mathrm{Cos}\left[\frac{1}{2}(7\,c+5\,d\,x)\right]+3\,\mathrm{Cos}\left[\frac{1}{2}(5\,c+7\,d\,x)\right]\right)\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}\right)$$

## Problem 335: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 195 leaves, 9 steps):

$$-\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{6\,a^3\,d}+\frac{\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^3}-\frac{\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^2}+\frac{\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{6\,d\,(a^3+a^3\,\mathrm{Sec}[c+d\,x])}$$

Result (type 5, 363 leaves):

$$\frac{1}{15 a^3 d (1+\text{Cos}[c+d x])^3} 2 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^6$$

$$\left(-\frac{1}{-1+e^{2 i c}} 2 i \sqrt{2} e^{-i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \left(3 \left(1+e^{2 i (c+d x)}\right)+3 \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+\right.\right.$$

$$\left.5 e^{i (c+d x)} \left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2 i (c+d x)}\right]\right)+$$

$$\frac{1}{32} \left(36 \text{Cos}\left[\frac{1}{2} (c-d x)\right]+9 \text{Cos}\left[\frac{1}{2} (3 c+d x)\right]+17 \text{Cos}\left[\frac{1}{2} (c+3 d x)\right]+16 \text{Cos}\left[\frac{1}{2} (5 c+3 d x)\right]+20 \text{Cos}\left[\frac{1}{2} (3 c+5 d x)\right]-\right.$$

$$\left.\left.5 \text{Cos}\left[\frac{1}{2} (7 c+5 d x)\right]+3 \text{Cos}\left[\frac{1}{2} (5 c+7 d x)\right]\right) \text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{1}{2} (c+d x)\right]^5 \sqrt{\text{Sec}[c+d x]}\right)$$

### Problem 336: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a+a \text{Cos}[c+d x])^3 \text{Sec}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 195 leaves, 9 steps):

$$-\frac{9 \sqrt{\text{Cos}[c+d x]} \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{10 a^3 d}+\frac{\sqrt{\text{Cos}[c+d x]} \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{2 a^3 d}-$$

$$\frac{\text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{5 d (a+a \text{Sec}[c+d x])^3}+\frac{2 \sqrt{\text{Sec}[c+d x]} \text{Sin}[c+d x]}{5 a d (a+a \text{Sec}[c+d x])^2}+\frac{\sqrt{\text{Sec}[c+d x]} \text{Sin}[c+d x]}{2 d \left(a^3+a^3 \text{Sec}[c+d x]\right)}$$

Result (type 5, 281 leaves):

$$\frac{1}{40 a^3 d (1+\text{Cos}[c+d x])^3}$$

$$e^{-i (2 c+d x)} \text{Cos}\left[\frac{1}{2} (c+d x)\right] \sqrt{\text{Sec}[c+d x]} \left(-9 i e^{-3 i (c+d x)} \left(1+e^{i (c+d x)}\right)^5 \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+\right.$$

$$160 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^5 \sqrt{\text{Cos}[c+d x]} \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+i \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)+$$

$$\left.2 i (34+64 \text{Cos}[c+d x]+34 \text{Cos}[2 (c+d x)]+12 \text{Cos}[3 (c+d x)]+3 i \text{Sin}[c+d x]+4 i \text{Sin}[2 (c+d x)]+3 i \text{Sin}[3 (c+d x)])\right)$$

$$\left(\text{Cos}\left[\frac{1}{2} (3 c+d x)\right]+i \text{Sin}\left[\frac{1}{2} (3 c+d x)\right]\right)$$

## Problem 337: Result unnecessarily involves higher level functions.

$$\int \frac{1}{(a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^{7/2}} \, dx$$

Optimal (type 4, 195 leaves, 9 steps):

$$\frac{49 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{10 a^3 d} - \frac{13 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{6 a^3 d} - \frac{\sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{5 d (a + a \operatorname{Sec}[c + d x])^3} - \frac{8 \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{15 a d (a + a \operatorname{Sec}[c + d x])^2} - \frac{13 \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{6 d \left(a^3 + a^3 \operatorname{Sec}[c + d x]\right)}$$

Result (type 5, 378 leaves):

$$\frac{1}{15 a^3 d (1 + \operatorname{Cos}[c + d x])^3} 2 \operatorname{Cos}\left[\frac{1}{2} (c + d x)\right]^6 \left(\frac{1}{-1 + e^{2 i c}} 2 i \sqrt{2} e^{-i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1 + e^{2 i (c+d x)}}} \left(147 \left(1 + e^{2 i (c+d x)}\right) + 147 \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right] + 65 e^{i (c+d x)} \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2 i (c+d x)}\right]\right) - \frac{1}{32} \left(1134 \operatorname{Cos}\left[\frac{1}{2} (c - d x)\right] + 1071 \operatorname{Cos}\left[\frac{1}{2} (3 c + d x)\right] + 923 \operatorname{Cos}\left[\frac{1}{2} (c + 3 d x)\right] + 694 \operatorname{Cos}\left[\frac{1}{2} (5 c + 3 d x)\right] + 470 \operatorname{Cos}\left[\frac{1}{2} (3 c + 5 d x)\right] + 265 \operatorname{Cos}\left[\frac{1}{2} (7 c + 5 d x)\right] + 117 \operatorname{Cos}\left[\frac{1}{2} (5 c + 7 d x)\right] + 30 \operatorname{Cos}\left[\frac{1}{2} (9 c + 7 d x)\right]\right) \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{1}{2} (c + d x)\right]^5 \sqrt{\operatorname{Sec}[c + d x]}\right)$$

## Problem 338: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{1}{(a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^{9/2}} \, dx$$

Optimal (type 4, 221 leaves, 10 steps):

$$-\frac{119 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{10 a^3 d} + \frac{11 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{2 a^3 d} + \frac{11 \operatorname{Sin}[c + d x]}{2 a^3 d \sqrt{\operatorname{Sec}[c + d x]}} - \frac{\operatorname{Sin}[c + d x]}{5 d \sqrt{\operatorname{Sec}[c + d x]} (a + a \operatorname{Sec}[c + d x])^3} - \frac{2 \operatorname{Sin}[c + d x]}{3 a d \sqrt{\operatorname{Sec}[c + d x]} (a + a \operatorname{Sec}[c + d x])^2} - \frac{119 \operatorname{Sin}[c + d x]}{30 d \sqrt{\operatorname{Sec}[c + d x]} \left(a^3 + a^3 \operatorname{Sec}[c + d x]\right)}$$

Result (type 5, 521 leaves):

$$-\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}119\,\sqrt{2}\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]+$$

$$\frac{22\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}\left(\frac{2\,(89+30\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{5\,d}+\frac{8\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d}-\right.$$

$$\frac{172\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\frac{88\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Sin}\left[\frac{d\,x}{2}\right]}{15\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{d\,x}{2}\right]}{5\,d}-$$

$$\left.\frac{48\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}+\frac{8\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d}-\frac{172\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{88\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 343: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 3, 57 leaves, 3 steps):

$$\frac{2\,\sqrt{a}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}$$

Result (type 3, 216 leaves):

$$\left(i\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]-\right.\right.$$

$$\left.\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\right)$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)\right)\Big/\left(\sqrt{2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\right)$$

- **Problem 344: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 92 leaves, 4 steps):

$$\frac{\sqrt{a}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{a\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 349 leaves) :

$$\frac{1}{2\sqrt{2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-i\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.2\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 345: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 136 leaves, 5 steps) :

$$\frac{3\sqrt{a}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{4\,d}+\frac{a\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{3\,a\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 391 leaves) :

$$\frac{1}{8\sqrt{2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-3\,i\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$3\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.4\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)$$

## Problem 349: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a + a \cos[c + d x])^{3/2} \sec[c + d x]^{3/2} \, dx$$

Optimal (type 3, 96 leaves, 5 steps):

$$\frac{2 a^{3/2} \text{ArcSin}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right] \sqrt{\cos[c+d x]} \sqrt{\sec[c+d x]}}{d} + \frac{2 a^2 \sqrt{\sec[c+d x]} \sin[c+d x]}{d \sqrt{a+a \cos[c+d x]}}$$

Result (type 3, 297 leaves):

$$\frac{1}{d \sqrt{\left(1+e^{2 i d x}\right) \cos[c] + i \left(-1+e^{2 i d x}\right) \sin[c]}} a \sqrt{a (1+\cos[c+d x])} \sec\left[\frac{1}{2} (c+d x)\right] \sqrt{\sec[c+d x]}$$
$$\left(\left(\cos\left[\frac{d x}{2}\right] + i \sin\left[\frac{d x}{2}\right]\right) \left(i \text{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right] + i \sin\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \cos[c] + i \left(-1+e^{2 i d x}\right) \sin[c]}\right] \cos[c+d x] -\right.\right.$$
$$\left. i \cos[c+d x] \text{Log}\left[2 \left(e^{i d x} \cos\left[\frac{c}{2}\right] + i e^{i d x} \sin\left[\frac{c}{2}\right] + \sqrt{\left(1+e^{2 i d x}\right) \cos[c] + i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right]\right) +$$
$$\left. 2 \sqrt{2} \left(\cos\left[\frac{d x}{2}\right] - i \sin\left[\frac{d x}{2}\right]\right) \sqrt{\cos[c+d x] (\cos[d x] + i \sin[d x])} \sin\left[\frac{1}{2} (c+d x)\right]\right)$$

## Problem 350: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a + a \cos[c + d x])^{3/2} \sqrt{\sec[c + d x]} \, dx$$

Optimal (type 3, 95 leaves, 5 steps):

$$\frac{3 a^{3/2} \text{ArcSin}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right] \sqrt{\cos[c+d x]} \sqrt{\sec[c+d x]}}{d} + \frac{a^2 \sin[c+d x]}{d \sqrt{a+a \cos[c+d x]} \sqrt{\sec[c+d x]}}$$

Result (type 3, 351 leaves):

$$\frac{1}{2 \sqrt{2} d \sqrt{\sec[c+d x]} \sqrt{\cos[c+d x] (\cos[d x] + i \sin[d x])}}$$
$$a \sqrt{a (1+\cos[c+d x])} \sec\left[\frac{1}{2} (c+d x)\right] \left(-3 i \cos\left[\frac{d x}{2}\right] \text{Log}\left[2 \left(e^{i d x} \cos\left[\frac{c}{2}\right] + i e^{i d x} \sin\left[\frac{c}{2}\right] + \sqrt{\left(1+e^{2 i d x}\right) \cos[c] + i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right] +\right.$$
$$3 i \text{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right] + i \sin\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \cos[c] + i \left(-1+e^{2 i d x}\right) \sin[c]}\right] \left(\cos\left[\frac{d x}{2}\right] + i \sin\left[\frac{d x}{2}\right]\right) +$$
$$3 \text{Log}\left[2 \left(e^{i d x} \cos\left[\frac{c}{2}\right] + i e^{i d x} \sin\left[\frac{c}{2}\right] + \sqrt{\left(1+e^{2 i d x}\right) \cos[c] + i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right] \sin\left[\frac{d x}{2}\right] +$$
$$\left. 2 \sqrt{2} \sqrt{\cos[c+d x] (\cos[d x] + i \sin[d x])} \sin\left[\frac{1}{2} (c+d x)\right]\right)$$

- **Problem 351: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 140 leaves, 6 steps):

$$\frac{7\,a^{3/2}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{4\,d}+\frac{a^2\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{7\,a^2\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 392 leaves):

$$\frac{1}{8\,\sqrt{2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}$$
$$a\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-7\,i\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$7\,i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$7\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.12\,\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)$$

- **Problem 352: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 180 leaves, 7 steps):

$$\frac{11\,a^{3/2}\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{8\,d}+\frac{a^2\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}}+$$
$$\frac{11\,a^2\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{11\,a^2\,\text{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 433 leaves):

$$\frac{1}{48\sqrt{2}\, d\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}}$$

$$a\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-33\,\mathrm{i}\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]+\right.$$

$$33\,\mathrm{i}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{d\,x}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)+$$

$$33\,\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+$$

$$52\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$\left.18\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+\mathrm{i}\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

- **Problem 356: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 3, 138 leaves, 5 steps):

$$\frac{2\,a^{5/2}\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{d}+\frac{14\,a^3\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,a^2\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 882 leaves):

$$\frac{1}{4}\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(\frac{1}{2}\,i\,\mathrm{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)\right)+$$

$$\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{4\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{3\,d}+\frac{4\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\right.$$

$$\left.\frac{\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{6\,d}\right)$$

- **Problem 357: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 134 leaves, 5 steps) :

$$\frac{5\,a^{5/2}\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{d}-$$

$$\frac{a^3\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{2\,a^2\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d}$$

Result (type 3, 575 leaves) :

$$\frac{1}{4\, d\, \sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}}\, a^2\, \sqrt{a\, (1+\text{Cos}[c+d\, x])}\, \text{Sec}\left[\frac{1}{2}\, (c+d\, x)\right]$$
$$\sqrt{\text{Sec}[c+d\, x]}\, \left(-5\, i\, \text{Cos}\left[c+\frac{d\, x}{2}\right] \text{Log}\left[2\, \left(e^{i\, d\, x}\, \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i\, d\, x}\, \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right)\right]-\right.$$
$$5\, i\, \text{Cos}\left[c+\frac{3\, d\, x}{2}\right] \text{Log}\left[2\, \left(e^{i\, d\, x}\, \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i\, d\, x}\, \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right)\right]+$$
$$10\, i\, \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right] \text{Cos}[c+d\, x]\, \left(\text{Cos}\left[\frac{d\, x}{2}\right]+i\, \text{Sin}\left[\frac{d\, x}{2}\right]\right)-$$
$$5\, \text{Log}\left[2\, \left(e^{i\, d\, x}\, \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i\, d\, x}\, \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[c+\frac{d\, x}{2}\right]+$$
$$6\, \sqrt{2}\, \sqrt{\text{Cos}[c+d\, x]\, (\text{Cos}[d\, x]+i\, \text{Sin}[d\, x])}\, \text{Sin}\left[\frac{1}{2}\, (c+d\, x)\right]+2\, \sqrt{2}\, \sqrt{\text{Cos}[c+d\, x]\, (\text{Cos}[d\, x]+i\, \text{Sin}[d\, x])}\, \text{Sin}\left[\frac{3}{2}\, (c+d\, x)\right]+$$
$$\left.5\, \text{Log}\left[2\, \left(e^{i\, d\, x}\, \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i\, d\, x}\, \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[c+\frac{3\, d\, x}{2}\right]\right)$$

- **Problem 358: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\, \text{Cos}[c+d\, x])^{5/2}\, \sqrt{\text{Sec}[c+d\, x]}\, dx$$

Optimal (type 3, 140 leaves, 5 steps):

$$\frac{19\, a^{5/2}\, \text{ArcSin}\left[\frac{\sqrt{a}\, \text{Sin}[c+d\, x]}{\sqrt{a+a\, \text{Cos}[c+d\, x]}}\right] \sqrt{\text{Cos}[c+d\, x]}\, \sqrt{\text{Sec}[c+d\, x]}}{4\, d}+\frac{9\, a^3\, \text{Sin}[c+d\, x]}{4\, d\, \sqrt{a+a\, \text{Cos}[c+d\, x]}\, \sqrt{\text{Sec}[c+d\, x]}}+\frac{a^2\, \sqrt{a+a\, \text{Cos}[c+d\, x]}\, \text{Sin}[c+d\, x]}{2\, d\, \sqrt{\text{Sec}[c+d\, x]}}$$

Result (type 3, 394 leaves):

$$\frac{1}{8\, \sqrt{2}\, d\, \sqrt{\text{Sec}[c+d\, x]}\, \sqrt{\text{Cos}[c+d\, x]\, (\text{Cos}[d\, x]+i\, \text{Sin}[d\, x])}}$$
$$a^2\, \sqrt{a\, (1+\text{Cos}[c+d\, x])}\, \text{Sec}\left[\frac{1}{2}\, (c+d\, x)\right] \left(-19\, i\, \text{Cos}\left[\frac{d\, x}{2}\right] \text{Log}\left[2\, \left(e^{i\, d\, x}\, \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i\, d\, x}\, \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right)\right]+\right.$$
$$19\, i\, \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right] \left(\text{Cos}\left[\frac{d\, x}{2}\right]+i\, \text{Sin}\left[\frac{d\, x}{2}\right]\right)+$$
$$19\, \text{Log}\left[2\, \left(e^{i\, d\, x}\, \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i\, d\, x}\, \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\, i\, d\, x}\right) \text{Cos}[c]+i\, \left(-1+e^{2\, i\, d\, x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[\frac{d\, x}{2}\right]+$$
$$\left.20\, \sqrt{2}\, \sqrt{\text{Cos}[c+d\, x]\, (\text{Cos}[d\, x]+i\, \text{Sin}[d\, x])}\, \text{Sin}\left[\frac{1}{2}\, (c+d\, x)\right]+2\, \sqrt{2}\, \sqrt{\text{Cos}[c+d\, x]\, (\text{Cos}[d\, x]+i\, \text{Sin}[d\, x])}\, \text{Sin}\left[\frac{3}{2}\, (c+d\, x)\right]\right)$$

### Problem 359: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}{\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 180 leaves, 6 steps):

$$\frac{25\,a^{5/2}\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{8\,d}+\frac{13\,a^3\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{a^2\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{25\,a^3\,\mathrm{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 435 leaves):

$$\frac{1}{48\,\sqrt{2}\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}$$
$$a^2\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-75\,i\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]+\right.$$
$$75\,i\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{d\,x}{2}\right]+i\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$75\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+$$
$$124\,\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$\left.30\,\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\,\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

### Problem 360: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 220 leaves, 7 steps):

$$\frac{163\,a^{5/2}\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,d}+\frac{17\,a^3\,\mathrm{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}}+$$
$$\frac{a^2\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{163\,a^3\,\mathrm{Sin}[c+d\,x]}{96\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{163\,a^3\,\mathrm{Sin}[c+d\,x]}{64\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 476 leaves):

$$\frac{1}{384\sqrt{2}\,d\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\,a^2\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]$$
$$\left(-489\,i\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$489\,i\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$489\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$800\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+270\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+$$
$$\left.80\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{5}{2}(c+d\,x)\right]+12\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{7}{2}(c+d\,x)\right]\right)$$

## Problem 361: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Sec}[c+d\,x]^{7/2}}{\sqrt{1+\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 154 leaves, 7 steps):

$$-\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+$$
$$\frac{26\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\sqrt{1+\text{Cos}[c+d\,x]}}-\frac{2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d\sqrt{1+\text{Cos}[c+d\,x]}}+\frac{2\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\sqrt{1+\text{Cos}[c+d\,x]}}$$

Result (type 3, 260 leaves):

$$\left(i\,e^{-i\,(c+d\,x)}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(26-30\,e^{i\,(c+d\,x)}+80\,e^{2\,i\,(c+d\,x)}-80\,e^{3\,i\,(c+d\,x)}+30\,e^{4\,i\,(c+d\,x)}-26\,e^{5\,i\,(c+d\,x)}+\right.\right.$$
$$\left.15\sqrt{2}\left(1+e^{2\,i\,(c+d\,x)}\right)^{5/2}\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-15\sqrt{2}\left(1+e^{2\,i\,(c+d\,x)}\right)^{5/2}\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)$$
$$\left.\sqrt{\text{Sec}[c+d\,x]}\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(15\,d\left(1+e^{2\,i\,(c+d\,x)}\right)^2\sqrt{1+\text{Cos}[c+d\,x]}\right)$$

## Problem 362: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Sec}[c+d\,x]^{5/2}}{\sqrt{1+\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 118 leaves, 6 steps):

$$\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}-\frac{2\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\sqrt{1+\text{Cos}[c+d\,x]}}+\frac{2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\sqrt{1+\text{Cos}[c+d\,x]}}$$

Result (type 3, 211 leaves):

$$\left(i\, e^{-i (c+d x)} \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]\left(2\left(-1+e^{i (c+d x)}\right)^3-3 \sqrt{2}\left(1+e^{2 i (c+d x)}\right)^{3/2} \operatorname{Log}\left[1+e^{i (c+d x)}\right]+3 \sqrt{2}\left(1+e^{2 i (c+d x)}\right)^{3/2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) \sqrt{\operatorname{Sec}[c+d x]}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+i \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)\right) \Big/ \left(3 d\left(1+e^{2 i (c+d x)}\right) \sqrt{1+\operatorname{Cos}[c+d x]}\right)$$

- **Problem 363: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\operatorname{Sec}[c+d x]^{3/2}}{\sqrt{1+\operatorname{Cos}[c+d x]}}\, dx$$

Optimal (type 3, 82 leaves, 4 steps):

$$-\frac{\sqrt{2} \operatorname{ArcSin}\left[\frac{\operatorname{Sin}[c+d x]}{1+\operatorname{Cos}[c+d x]}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{d}+\frac{2 \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{d \sqrt{1+\operatorname{Cos}[c+d x]}}$$

Result (type 3, 170 leaves):

$$\frac{1}{2 d \sqrt{1+\operatorname{Cos}[c+d x]}} i\, e^{-i (c+d x)}\left(1+e^{i (c+d x)}\right)\left(2-2 e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Log}\left[1+e^{i (c+d x)}\right]-\sqrt{2} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) \sqrt{\operatorname{Sec}[c+d x]}$$

- **Problem 364: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Sec}[c+d x]}}{\sqrt{1+\operatorname{Cos}[c+d x]}}\, dx$$

Optimal (type 3, 47 leaves, 3 steps):

$$\frac{\sqrt{2} \operatorname{ArcSin}\left[\frac{\operatorname{Sin}[c+d x]}{1+\operatorname{Cos}[c+d x]}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{d}$$

Result (type 3, 146 leaves):

$$-\frac{1}{d \sqrt{1+\operatorname{Cos}[c+d x]}} 2\, i\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]\left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)$$

- **Problem 365: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{1+\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}\, dx$$

Optimal (type 3, 94 leaves, 6 steps):

$$-\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{1+\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}$$

Result (type 3, 207 leaves) :

$$\frac{1}{d\sqrt{1+\text{Cos}[c+d\,x]}}\sqrt{2}\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(d\,x-i\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+i\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)$$

## Problem 366: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{1}{\sqrt{1+\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 125 leaves, 7 steps) :

$$\frac{\sqrt{2}\,\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}-\frac{\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{\sqrt{1+\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{\text{Sin}[c+d\,x]}{d\sqrt{1+\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 244 leaves) :

$$\frac{1}{2\,d\sqrt{1+\text{Cos}[c+d\,x]}}$$
$$i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\sqrt{2}\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(i\,d\,x+\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-2\,\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+\right.\right.$$
$$\left.\left.2\,\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+2\,i\,\sqrt{\text{Sec}[c+d\,x]}\,\left(\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)$$

## Problem 367: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Sec}[c+d\,x]^{7/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 189 leaves, 7 steps) :

$$-\frac{\sqrt{2}\ \text{ArcTan}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{2}\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\ d}+$$

$$\frac{26\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{15\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 262 leaves) :

$$\left(i\,e^{-i\,(c+d\,x)}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(26-30\,e^{i\,(c+d\,x)}+80\,e^{2\,i\,(c+d\,x)}-80\,e^{3\,i\,(c+d\,x)}+30\,e^{4\,i\,(c+d\,x)}-26\,e^{5\,i\,(c+d\,x)}+\right.\right.$$
$$15\sqrt{2}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{5/2}\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-15\sqrt{2}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{5/2}\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\Big)$$
$$\left.\sqrt{\text{Sec}[c+d\,x]}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(15\,d\,\left(1+e^{2\,i\,(c+d\,x)}\right)^2\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 368: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d\,x]^{5/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 151 leaves, 6 steps) :

$$\frac{\sqrt{2}\ \text{ArcTan}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{2}\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\ d}-\frac{2\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{3\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 213 leaves) :

$$\left(i\,e^{-i\,(c+d\,x)}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right.$$
$$\left(2\left(-1+e^{i\,(c+d\,x)}\right)^3-3\sqrt{2}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{3/2}\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+3\sqrt{2}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{3/2}\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)$$
$$\left.\sqrt{\text{Sec}[c+d\,x]}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+i\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(3\,d\,\left(1+e^{2\,i\,(c+d\,x)}\right)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 369: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d\,x]^{3/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 113 leaves, 5 steps) :

$$-\frac{\sqrt{2}\ \text{ArcTan}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{2}\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\ d}+\frac{2\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 172 leaves) :

$$\frac{1}{2\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\,\mathrm{i}\,e^{-\mathrm{i}\,(c+d\,x)}\,\left(1+e^{\mathrm{i}\,(c+d\,x)}\right)\left(2-2\,e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]-\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\right]\right)\sqrt{\text{Sec}[c+d\,x]}$$

- **Problem 370: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 56 leaves, 3 steps) :

$$\frac{\sqrt{2}\,\text{ArcTan}\left[\frac{\sqrt{a}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 148 leaves) :

$$-\frac{1}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}2\,\mathrm{i}\,e^{-\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\mathrm{i}\,(c+d\,x)}}{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\right]\right)$$

- **Problem 371: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 105 leaves, 6 steps) :

$$\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,\text{ArcTan}\left[\frac{\sqrt{a}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 209 leaves) :

$$\frac{1}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\sqrt{2}\,e^{-\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\mathrm{i}\,(c+d\,x)}}{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(d\,x-\mathrm{i}\,\text{ArcSinh}\left[e^{\mathrm{i}\,(c+d\,x)}\right]+\mathrm{i}\,\sqrt{2}\,\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]+\mathrm{i}\,\text{Log}\left[1+\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\right]-\mathrm{i}\,\sqrt{2}\,\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\right]\right)$$

- **Problem 372: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 168 leaves, 7 steps) :

$$-\frac{\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+$$

$$\frac{\sqrt{2}\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+\frac{\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 246 leaves) :

$$\frac{1}{2\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\sqrt{2}\,e^{-\frac{1}{2}\,\text{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\text{i}\,(c+d\,x)}}{1+e^{2\,\text{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\,\left(\text{i}\,d\,x+\text{ArcSinh}\left[e^{\text{i}\,(c+d\,x)}\right]-2\,\sqrt{2}\,\text{Log}\left[1+e^{\text{i}\,(c+d\,x)}\right]-\text{Log}\left[1+\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]+\right.\right.$$

$$\left.\left.2\,\sqrt{2}\,\text{Log}\left[1-e^{\text{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]\right)+2\,\text{i}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 373: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 197 leaves, 7 steps) :

$$\frac{11\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-$$

$$\frac{19\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{7\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 316 leaves) :

$$-\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$

$$11\,\mathrm{i}\,e^{-\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}\sqrt{\frac{e^{\mathrm{i}\,(c+d\,x)}}{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\right]\right)+$$

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(-\frac{38\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{3\,d}-\frac{38\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+\frac{8\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

- **Problem 374: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 157 leaves, 6 steps):

$$-\frac{7\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{5\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 288 leaves):

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$

$$7\,\mathrm{i}\,e^{-\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}\sqrt{\frac{e^{\mathrm{i}\,(c+d\,x)}}{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\right]\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\text{Sec}[c+d\,x]}\left(\frac{10\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}+\frac{10\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}-\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Sin}\left[\frac{d\,x}{2}\right]}{d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

- **Problem 375: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Sec}[c+d\,x]}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 117 leaves, 5 steps):

$$\frac{3\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 277 leaves):

$$\frac{1}{2\,d\,(a\,(1+\cos[c+d\,x]))^{3/2}\sqrt{\sec[c+d\,x]}}\,e^{-\frac{1}{2}i\,(c+d\,x)}\cos\left[\frac{1}{2}(c+d\,x)\right]$$
$$\left(2\,e^{\frac{1}{2}i\,(c+d\,x)}\sec\left[\frac{c}{2}\right]\sec[c+d\,x]\sin\left[\frac{d\,x}{2}\right]+2\,e^{\frac{1}{2}i\,(c+d\,x)}\cos\left[\frac{1}{2}(c+d\,x)\right]\sec[c+d\,x]\tan\left[\frac{c}{2}\right]-e^{-i\,(c+d\,x)}\cos\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$
$$\left.\left(-2+2\,e^{i\,(c+d\,x)}-3\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]+3\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)(-i+\tan[c+d\,x])\right)$$

- **Problem 376: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+a\cos[c+d\,x])^{3/2}\sqrt{\sec[c+d\,x]}}\,dx$$

Optimal (type 3, 117 leaves, 5 steps):

$$\frac{\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{2}\sqrt{\cos[c+d\,x]}\sqrt{a+a\cos[c+d\,x]}}\right]\sqrt{\cos[c+d\,x]}\sqrt{\sec[c+d\,x]}}{2\sqrt{2}\,a^{3/2}\,d}+\frac{\sin[c+d\,x]}{2\,d\,(a+a\cos[c+d\,x])^{3/2}\sqrt{\sec[c+d\,x]}}$$

Result (type 3, 288 leaves):

$$-\frac{1}{d\,(a\,(1+\cos[c+d\,x]))^{3/2}}\,i\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$
$$\frac{\cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\sec[c+d\,x]}\left(\frac{2\cos\left[\frac{d\,x}{2}\right]\sin\left[\frac{c}{2}\right]}{d}+\frac{2\cos\left[\frac{c}{2}\right]\sin\left[\frac{d\,x}{2}\right]}{d}-\frac{\sec\left[\frac{c}{2}\right]\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sin\left[\frac{d\,x}{2}\right]}{d}-\frac{\sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]\tan\left[\frac{c}{2}\right]}{d}\right)}{(a\,(1+\cos[c+d\,x]))^{3/2}}$$

- **Problem 377: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{(a+a\cos[c+d\,x])^{3/2}\sec[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 174 leaves, 7 steps):

$$\frac{2\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{a+a\cos[c+d\,x]}}\right]\sqrt{\cos[c+d\,x]}\sqrt{\sec[c+d\,x]}}{a^{3/2}\,d}-$$
$$\frac{5\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{2}\sqrt{\cos[c+d\,x]}\sqrt{a+a\cos[c+d\,x]}}\right]\sqrt{\cos[c+d\,x]}\sqrt{\sec[c+d\,x]}}{2\sqrt{2}\,a^{3/2}\,d}-\frac{\sin[c+d\,x]}{2\,d\,(a+a\cos[c+d\,x])^{3/2}\sqrt{\sec[c+d\,x]}}$$

Result (type 3, 263 leaves):

$$\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^3\left(\sqrt{2}\, e^{-\frac{1}{2} i (c+d x)}\sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}}\sqrt{1+e^{2 i (c+d x)}}\right.\right.$$
$$\left(4 d x-4 i\, \text{ArcSinh}\left[e^{i (c+d x)}\right]+5 i \sqrt{2}\, \text{Log}\left[1+e^{i (c+d x)}\right]+4 i\, \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-5 i \sqrt{2}\, \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)+$$
$$\left.\left.\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{\text{Sec}[c+d x]}\left(\text{Sin}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{3}{2}(c+d x)\right]\right)\right)\right)\Big/\left(2 d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\right)$$

## Problem 378: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{5/2}}\,dx$$

Optimal (type 3, 214 leaves, 8 steps):

$$-\frac{3\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{a^{3/2}\,d}+\frac{9\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{2\sqrt{2}\,a^{3/2}\,d}-$$
$$\frac{\text{Sin}[c+d x]}{2 d\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{3/2}}+\frac{3\,\text{Sin}[c+d x]}{2 a d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 347 leaves):

$$-\left(3 i\, e^{-\frac{1}{2} i (c+d x)}\sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}}\sqrt{1+e^{2 i (c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\right.$$
$$\left.\left(-2 i d x-2\,\text{ArcSinh}\left[e^{i (c+d x)}\right]+3\sqrt{2}\,\text{Log}\left[1+e^{i (c+d x)}\right]+2\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-3\sqrt{2}\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)\right)\Big/$$
$$\left(\sqrt{2}\, d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{3/2}}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\sqrt{\text{Sec}[c+d x]}$$
$$\left(\frac{2\,\text{Cos}\left[\frac{3 d x}{2}\right]\text{Sin}\left[\frac{3 c}{2}\right]}{d}-\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Sin}\left[\frac{d x}{2}\right]}{d}+\frac{2\,\text{Cos}\left[\frac{3 c}{2}\right]\text{Sin}\left[\frac{3 d x}{2}\right]}{d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

## Problem 379: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Sec}[c+d x]^{5/2}}{(a+a\,\text{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 3, 237 leaves, 8 steps):

$$\frac{163\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{16\sqrt{2}\,a^{5/2}\,d}-\frac{299\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{48\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d x]}}-$$

$$\frac{\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{4\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}}-\frac{17\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}+\frac{95\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{48\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 387 leaves) :

$$-\left(163\,i\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\,\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(\text{Log}\left[1+e^{i(c+d x)}\right]-\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\,\sqrt{1+e^{2i(c+d x)}}\right]\right)\right)\Big/$$

$$\left(4\,d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{5/2}}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}\left(-\frac{299\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{6\,d}-\frac{299\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{6\,d}+\frac{21\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Sin}\left[\frac{d x}{2}\right]}{4\,d}+\right.$$

$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Sin}\left[\frac{d x}{2}\right]}{2\,d}+\frac{16\,\text{Sec}[c+d x]\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{3\,d}+\frac{21\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{4\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{2\,d}\right)$$

- **Problem 380: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d x]^{3/2}}{(a+a\,\text{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 3, 197 leaves, 7 steps) :

$$-\frac{75\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{16\sqrt{2}\,a^{5/2}\,d}-$$

$$\frac{\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{4\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}}-\frac{13\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}+\frac{49\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{16\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 361 leaves) :

$$\left(75\,i\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\sqrt{1+e^{2i(c+dx)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(4\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{5/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+dx]))^{5/2}}\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\mathrm{Sec}[c+dx]}\left(\frac{49\,\mathrm{Cos}\left[\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{2d}+\frac{49\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{2d}-\frac{13\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\mathrm{Sin}\left[\frac{dx}{2}\right]}{4d}-\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Sin}\left[\frac{dx}{2}\right]}{2d}-\frac{13\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{4d}-\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{2d}\right)$$

- **Problem 381: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\mathrm{Sec}[c+dx]}}{(a+a\,\mathrm{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 3, 157 leaves, 6 steps):

$$\frac{19\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{2}\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]\sqrt{\mathrm{Cos}[c+dx]}\sqrt{\mathrm{Sec}[c+dx]}}{16\sqrt{2}\,a^{5/2}\,d}-\frac{\mathrm{Sin}[c+dx]}{4\,d\,(a+a\,\mathrm{Cos}[c+dx])^{5/2}\sqrt{\mathrm{Sec}[c+dx]}}-\frac{9\,\mathrm{Sin}[c+dx]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}\sqrt{\mathrm{Sec}[c+dx]}}$$

Result (type 3, 361 leaves):

$$-\left(19\,i\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\sqrt{1+e^{2i(c+dx)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(4\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{5/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+dx]))^{5/2}}\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\mathrm{Sec}[c+dx]}\left(-\frac{9\,\mathrm{Cos}\left[\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{2d}-\frac{9\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{2d}+\frac{5\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\mathrm{Sin}\left[\frac{dx}{2}\right]}{4d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Sin}\left[\frac{dx}{2}\right]}{2d}+\frac{5\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{4d}+\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{2d}\right)$$

- **Problem 382: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 157 leaves, 6 steps):

$$\frac{5\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}+\frac{\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 361 leaves):

$$-\left(5\,i\,e^{-\frac{1}{2}i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{2\,d}+\frac{\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+\frac{3\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}-\right.$$
$$\left.\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+\frac{3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{4\,d}-\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{2\,d}\right)$$

- **Problem 383: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 157 leaves, 6 steps):

$$\frac{3\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{7\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 361 leaves):

$$-\left(3\,i\,e^{-\frac{1}{2} i (c+d x)}\sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}}\sqrt{1+e^{2 i (c+d x)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(\mathrm{Log}\left[1+e^{i (c+d x)}\right]-\mathrm{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)\right)\Big/$$
$$\left(4\,d\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d x]}\left(\frac{7\,\mathrm{Cos}\left[\frac{d x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{2 d}+\frac{7\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d x}{2}\right]}{2 d}-\frac{11\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\mathrm{Sin}\left[\frac{d x}{2}\right]}{4 d}+\right.$$
$$\left.\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\mathrm{Sin}\left[\frac{d x}{2}\right]}{2 d}-\frac{11\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{4 d}+\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 384: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{1}{(a+a\,\mathrm{Cos}[c+d x])^{5/2}\,\mathrm{Sec}[c+d x]^{5/2}}\,dx$$

Optimal (type 3, 214 leaves, 8 steps):

$$\frac{2\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{\mathrm{Sec}[c+d x]}}{a^{5/2}\,d}-\frac{43\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{\mathrm{Sec}[c+d x]}}{16\,\sqrt{2}\,a^{5/2}\,d}-$$
$$\frac{\mathrm{Sin}[c+d x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d x])^{5/2}\,\mathrm{Sec}[c+d x]^{3/2}}-\frac{11\,\mathrm{Sin}[c+d x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d x])^{3/2}\sqrt{\mathrm{Sec}[c+d x]}}$$

Result (type 3, 424 leaves):

$$\left(e^{-\frac{1}{2} i (c+d x)}\sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}}\sqrt{1+e^{2 i (c+d x)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\right.$$
$$\left.\left(32\,d\,x-32\,i\,\mathrm{ArcSinh}\left[e^{i (c+d x)}\right]+43\,i\,\sqrt{2}\,\mathrm{Log}\left[1+e^{i (c+d x)}\right]+32\,i\,\mathrm{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-43\,i\,\sqrt{2}\,\mathrm{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)\right)\Big/$$
$$\left(4\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}}\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d x]}\left(-\frac{15\,\mathrm{Cos}\left[\frac{d x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{2 d}-\frac{15\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d x}{2}\right]}{2 d}+\right.$$
$$\left.\frac{19\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\mathrm{Sin}\left[\frac{d x}{2}\right]}{4 d}-\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\mathrm{Sin}\left[\frac{d x}{2}\right]}{2 d}+\frac{19\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

## Problem 385: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 3, 254 leaves, 9 steps):

$$-\frac{5\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{a^{5/2}\,d}+\frac{115\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{5/2}}-\frac{15\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{35\,\mathrm{Sin}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 289 leaves):

$$\frac{1}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5\left(-5\,i\,\sqrt{2}\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right.$$
$$\left(-16\,i\,d\,x-16\,\mathrm{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+23\,\sqrt{2}\,\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]+16\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-23\,\sqrt{2}\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$
$$\left.\frac{1}{4}\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^4\sqrt{\mathrm{Sec}[c+d\,x]}\left(16\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+39\,\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+47\,\mathrm{Sin}\left[\frac{5}{2}(c+d\,x)\right]+8\,\mathrm{Sin}\left[\frac{7}{2}(c+d\,x)\right]\right)\right)$$

## Problem 386: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\mathrm{Sec}[c+d\,x]^{5/2}}{(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 277 leaves, 9 steps):

$$\frac{1015\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{629\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{64\,a^3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}-\frac{\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{6\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}}-\frac{23\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}-\frac{109\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{64\,a^2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{193\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{64\,a^3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 450 leaves):

$$-\left(1015\, i\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(\mathrm{Log}\left[1+e^{i (c+d x)}\right]-\mathrm{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(8 d (a (1+\cos[c+d x]))^{7/2}\right)+\frac{1}{(a (1+\cos[c+d x]))^{7/2}} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\sec[c+d x]} \left(-\frac{629 \cos\left[\frac{d x}{2}\right] \sin\left[\frac{c}{2}\right]}{4 d}-\frac{629 \cos\left[\frac{c}{2}\right] \sin\left[\frac{d x}{2}\right]}{4 d}+\frac{451 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sin\left[\frac{d x}{2}\right]}{24 d}+\frac{31 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \sin\left[\frac{d x}{2}\right]}{12 d}+\frac{\sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sin\left[\frac{d x}{2}\right]}{3 d}+\frac{32 \sec[c+d x] \sin\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}+\frac{451 \sec\left[\frac{c}{2}+\frac{d x}{2}\right] \tan\left[\frac{c}{2}\right]}{24 d}+\frac{31 \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \tan\left[\frac{c}{2}\right]}{12 d}+\frac{\sec\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \tan\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 387: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\sec[c+d x]^{3/2}}{(a+a \cos[c+d x])^{7/2}}\, dx$$

Optimal (type 3, 237 leaves, 8 steps):

$$-\frac{363 \operatorname{ArcTan}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{2} \sqrt{\cos[c+d x]} \sqrt{a+a \cos[c+d x]}}\right] \sqrt{\cos[c+d x]} \sqrt{\sec[c+d x]}}{64 \sqrt{2}\, a^{7/2} d}-\frac{\sqrt{\sec[c+d x]} \sin[c+d x]}{6 d (a+a \cos[c+d x])^{7/2}}-\frac{19 \sqrt{\sec[c+d x]} \sin[c+d x]}{48 a d (a+a \cos[c+d x])^{5/2}}-\frac{199 \sqrt{\sec[c+d x]} \sin[c+d x]}{192 a^2 d (a+a \cos[c+d x])^{3/2}}+\frac{691 \sqrt{\sec[c+d x]} \sin[c+d x]}{192 a^3 d \sqrt{a+a \cos[c+d x]}}$$

Result (type 3, 424 leaves):

$$\left(363\, i\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(\mathrm{Log}\left[1+e^{i (c+d x)}\right]-\mathrm{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(8 d (a (1+\cos[c+d x]))^{7/2}\right)+\frac{1}{(a (1+\cos[c+d x]))^{7/2}} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\sec[c+d x]} \left(\frac{691 \cos\left[\frac{d x}{2}\right] \sin\left[\frac{c}{2}\right]}{12 d}+\frac{691 \cos\left[\frac{c}{2}\right] \sin\left[\frac{d x}{2}\right]}{12 d}-\frac{199 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sin\left[\frac{d x}{2}\right]}{24 d}-\frac{19 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \sin\left[\frac{d x}{2}\right]}{12 d}-\frac{\sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sin\left[\frac{d x}{2}\right]}{3 d}-\frac{199 \sec\left[\frac{c}{2}+\frac{d x}{2}\right] \tan\left[\frac{c}{2}\right]}{24 d}-\frac{19 \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \tan\left[\frac{c}{2}\right]}{12 d}-\frac{\sec\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \tan\left[\frac{c}{2}\right]}{3 d}\right)$$

### Problem 388: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{\text{Sec}[c+d x]}}{(a+a \text{Cos}[c+d x])^{7/2}} \, dx$$

Optimal (type 3, 197 leaves, 7 steps):

$$\frac{63 \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}{64 \sqrt{2} a^{7/2} d}-\frac{\text{Sin}[c+d x]}{6 d (a+a \text{Cos}[c+d x])^{7/2} \sqrt{\text{Sec}[c+d x]}}-\frac{5 \text{Sin}[c+d x]}{16 a d (a+a \text{Cos}[c+d x])^{5/2} \sqrt{\text{Sec}[c+d x]}}-\frac{103 \text{Sin}[c+d x]}{192 a^2 d (a+a \text{Cos}[c+d x])^{3/2} \sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 424 leaves):

$$-\left(63 \, i \, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$

$$\left(8 d (a (1+\text{Cos}[c+d x]))^{7/2}\right)+\frac{1}{(a (1+\text{Cos}[c+d x]))^{7/2}}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\text{Sec}[c+d x]} \left(-\frac{103 \text{Cos}\left[\frac{d x}{2}\right] \text{Sin}\left[\frac{c}{2}\right]}{12 d}-\frac{103 \text{Cos}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]}{12 d}+\frac{43 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sin}\left[\frac{d x}{2}\right]}{24 d}+\right.$$

$$\left.\frac{7 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sin}\left[\frac{d x}{2}\right]}{12 d}+\frac{\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}\left[\frac{d x}{2}\right]}{3 d}+\frac{43 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Tan}\left[\frac{c}{2}\right]}{24 d}+\frac{7 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Tan}\left[\frac{c}{2}\right]}{12 d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \text{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

### Problem 389: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+a \text{Cos}[c+d x])^{7/2} \sqrt{\text{Sec}[c+d x]}} \, dx$$

Optimal (type 3, 197 leaves, 7 steps):

$$\frac{13 \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}{64 \sqrt{2} a^{7/2} d}+\frac{\text{Sin}[c+d x]}{6 d (a+a \text{Cos}[c+d x])^{7/2} \sqrt{\text{Sec}[c+d x]}}+\frac{\text{Sin}[c+d x]}{16 a d (a+a \text{Cos}[c+d x])^{5/2} \sqrt{\text{Sec}[c+d x]}}-\frac{5 \text{Sin}[c+d x]}{192 a^2 d (a+a \text{Cos}[c+d x])^{3/2} \sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 424 leaves):

$$-\left(13\,i\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7\left(\text{Log}\left[1+e^{i(c+d x)}\right]-\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2i(c+d x)}}\right]\right)\right)\Big/$$
$$\left(8\,d\,(a\,(1+\text{Cos}[c+d x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{7/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7\sqrt{\text{Sec}[c+d x]}\left(-\frac{5\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{12\,d}-\frac{5\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{12\,d}+\frac{17\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Sin}\left[\frac{d x}{2}\right]}{24\,d}+\frac{5\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Sin}\left[\frac{d x}{2}\right]}{12\,d}-\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Sin}\left[\frac{d x}{2}\right]}{3\,d}+\frac{17\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{5\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{12\,d}-\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 390: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+a\,\text{Cos}[c+d x])^{7/2}\,\text{Sec}[c+d x]^{3/2}}\,dx$$

Optimal (type 3, 197 leaves, 7 steps):

$$\frac{7\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\sqrt{\text{Cos}[c+d x]}\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\sqrt{\text{Sec}[c+d x]}}{64\sqrt{2}\,a^{7/2}\,d}-\frac{\text{Sin}[c+d x]}{6\,d\,(a+a\,\text{Cos}[c+d x])^{7/2}\sqrt{\text{Sec}[c+d x]}}+$$
$$\frac{3\,\text{Sin}[c+d x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}\sqrt{\text{Sec}[c+d x]}}+\frac{17\,\text{Sin}[c+d x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 424 leaves):

$$-\left(7\,i\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7\left(\text{Log}\left[1+e^{i(c+d x)}\right]-\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2i(c+d x)}}\right]\right)\right)\Big/$$
$$\left(8\,d\,(a\,(1+\text{Cos}[c+d x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{7/2}}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7\sqrt{\text{Sec}[c+d x]}\left(\frac{17\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{12\,d}+\frac{17\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{12\,d}+\frac{19\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Sin}\left[\frac{d x}{2}\right]}{24\,d}-\frac{17\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Sin}\left[\frac{d x}{2}\right]}{12\,d}+\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Sin}\left[\frac{d x}{2}\right]}{3\,d}+\frac{19\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24\,d}-\frac{17\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{12\,d}+\frac{\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 391: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 197 leaves, 7 steps):

$$\frac{5\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{\mathrm{Sin}[c+d\,x]}{6\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}-\frac{13\,\mathrm{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{67\,\mathrm{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 424 leaves):

$$-\left(5\,i\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$
$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+d\,x]))^{7/2}}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{67\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{12\,d}+\frac{67\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{12\,d}-\frac{151\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d}+\frac{29\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{12\,d}-\right.$$
$$\left.\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{3\,d}-\frac{151\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{29\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{12\,d}-\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 392: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 3, 254 leaves, 9 steps):

$$\frac{2\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{a^{7/2}\,d}-\frac{177\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{\mathrm{Sin}[c+d\,x]}{6\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^{5/2}}-\frac{17\,\mathrm{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}-\frac{49\,\mathrm{Sin}[c+d\,x]}{64\,a^2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 487 leaves):

$$\left(e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(128 d x-128 i \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]+ 177 i \sqrt{2} \operatorname{Log}\left[1+e^{i (c+d x)}\right]+128 i \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-177 i \sqrt{2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(8 \sqrt{2} d (a (1+\operatorname{Cos}[c+d x]))^{7/2}\right)+\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{7/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\operatorname{Sec}[c+d x]} \left(-\frac{247 \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]}{12 d}-\frac{247 \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d}+\frac{379 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{24 d}-\frac{41 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d}+ \frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Sin}\left[\frac{d x}{2}\right]}{3 d}+\frac{379 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{24 d}-\frac{41 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{12 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 393: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{(a+a \operatorname{Cos}[c+d x])^{7/2} \operatorname{Sec}[c+d x]^{9/2}} \, dx$$

Optimal (type 3, 294 leaves, 10 steps):

$$-\frac{7 \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{a^{7/2} d}+\frac{637 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{64 \sqrt{2} a^{7/2} d}- \frac{\operatorname{Sin}[c+d x]}{6 d (a+a \operatorname{Cos}[c+d x])^{7/2} \operatorname{Sec}[c+d x]^{7/2}}-\frac{7 \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sec}[c+d x]^{5/2}}- \frac{259 \operatorname{Sin}[c+d x]}{192 a^2 d (a+a \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^{3/2}}+\frac{189 \operatorname{Sin}[c+d x]}{64 a^3 d \sqrt{a+a \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 519 leaves):

$$-\left(7\, i\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(-64\, i\, d x - 64 \operatorname{ArcSinh}\left[e^{i (c+d x)}\right] + 91 \sqrt{2} \operatorname{Log}\left[1+e^{i (c+d x)}\right] + 64 \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right] - 91 \sqrt{2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(8 \sqrt{2}\, d\, (a (1+\operatorname{Cos}[c+d x]))^{7/2}\right) + \frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{7/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\operatorname{Sec}[c+d x]} \left(\frac{427 \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]}{12 d} + \frac{8 \operatorname{Cos}\left[\frac{3 d x}{2}\right] \operatorname{Sin}\left[\frac{3 c}{2}\right]}{d} + \frac{427 \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d} - \frac{703 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{24 d} + \frac{53 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d} - \frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Sin}\left[\frac{d x}{2}\right]}{3 d} + \frac{8 \operatorname{Cos}\left[\frac{3 c}{2}\right] \operatorname{Sin}\left[\frac{3 d x}{2}\right]}{d} - \frac{703 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{24 d} + \frac{53 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{12 d} - \frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 394: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+a \operatorname{Cos}[c+d x])^{9/2} \operatorname{Sec}[c+d x]^{5/2}} \, dx$$

Optimal (type 3, 237 leaves, 8 steps) :

$$\frac{45 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{1024 \sqrt{2}\, a^{9/2} d} - \frac{\operatorname{Sin}[c+d x]}{8 d (a+a \operatorname{Cos}[c+d x])^{9/2} \operatorname{Sec}[c+d x]^{3/2}} - \frac{5 \operatorname{Sin}[c+d x]}{32 a d (a+a \operatorname{Cos}[c+d x])^{7/2} \sqrt{\operatorname{Sec}[c+d x]}} + \frac{33 \operatorname{Sin}[c+d x]}{256 a^2 d (a+a \operatorname{Cos}[c+d x])^{5/2} \sqrt{\operatorname{Sec}[c+d x]}} + \frac{73 \operatorname{Sin}[c+d x]}{1024 a^3 d (a+a \operatorname{Cos}[c+d x])^{3/2} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 487 leaves) :

$$-\left(45\, i\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^9 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$

$$\left(64\, d\, (a (1+\operatorname{Cos}[c+d x]))^{9/2}\right)+\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{9/2}}$$

$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^9 \sqrt{\operatorname{Sec}[c+d x]} \left(\frac{73 \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]}{32 d}+\frac{73 \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]}{32 d}+\frac{59 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Sin}\left[\frac{d x}{2}\right]}{64 d}-\right.$$

$$\frac{105 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Sin}\left[\frac{d x}{2}\right]}{32 d}+\frac{13 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Sin}\left[\frac{d x}{2}\right]}{8 d}-\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d}+$$

$$\left.\frac{59 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{64 d}-\frac{105 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{32 d}+\frac{13 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Tan}\left[\frac{c}{2}\right]}{8 d}-\frac{\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}\right)$$

- **Problem 395: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+a \operatorname{Cos}[c+d x])^{9/2} \operatorname{Sec}[c+d x]^{7/2}} \, dx$$

Optimal (type 3, 237 leaves, 8 steps) :

$$\frac{35 \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{1024 \sqrt{2}\, a^{9/2} d}-\frac{\operatorname{Sin}[c+d x]}{8 d (a+a \operatorname{Cos}[c+d x])^{9/2} \operatorname{Sec}[c+d x]^{5/2}}-$$

$$\frac{19 \operatorname{Sin}[c+d x]}{96 a d (a+a \operatorname{Cos}[c+d x])^{7/2} \operatorname{Sec}[c+d x]^{3/2}}-\frac{187 \operatorname{Sin}[c+d x]}{768 a^2 d (a+a \operatorname{Cos}[c+d x])^{5/2} \sqrt{\operatorname{Sec}[c+d x]}}+\frac{853 \operatorname{Sin}[c+d x]}{3072 a^3 d (a+a \operatorname{Cos}[c+d x])^{3/2} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 487 leaves) :

$$-\left(35\,i\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\sqrt{1+e^{2i(c+dx)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^9\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/$$

$$\left(64\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{9/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+dx]))^{9/2}}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^9\sqrt{\mathrm{Sec}[c+dx]}\left(\frac{853\,\mathrm{Cos}\left[\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{96\,d}+\frac{853\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{96\,d}-\frac{2593\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\mathrm{Sin}\left[\frac{dx}{2}\right]}{192\,d}+\right.$$

$$\frac{779\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Sin}\left[\frac{dx}{2}\right]}{96\,d}-\frac{55\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\mathrm{Sin}\left[\frac{dx}{2}\right]}{24\,d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\mathrm{Sin}\left[\frac{dx}{2}\right]}{4\,d}-$$

$$\left.\frac{2593\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{192\,d}+\frac{779\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{96\,d}-\frac{55\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\mathrm{Tan}\left[\frac{c}{2}\right]}{4\,d}\right)$$

- **Problem 397: Unable to integrate problem.**

$$\int \mathrm{Cos}[c+dx]^m\,(a+a\,\mathrm{Cos}[c+dx])^4\,dx$$

Optimal (type 5, 302 leaves, 7 steps) :

$$\frac{a^4\left(55+29m+4m^2\right)\mathrm{Cos}[c+dx]^{1+m}\,\mathrm{Sin}[c+dx]}{d\,(2+m)\,(3+m)\,(4+m)}+$$

$$\frac{\mathrm{Cos}[c+dx]^{1+m}\left(a^2+a^2\,\mathrm{Cos}[c+dx]\right)^2\mathrm{Sin}[c+dx]}{d\,(4+m)}+\frac{2\,(5+m)\,\mathrm{Cos}[c+dx]^{1+m}\left(a^4+a^4\,\mathrm{Cos}[c+dx]\right)\mathrm{Sin}[c+dx]}{d\,(3+m)\,(4+m)}-$$

$$\frac{a^4\left(35+40m+8m^2\right)\mathrm{Cos}[c+dx]^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\mathrm{Cos}[c+dx]^2\right]\mathrm{Sin}[c+dx]}{d\,(1+m)\,(2+m)\,(4+m)\sqrt{\mathrm{Sin}[c+dx]^2}}-$$

$$\frac{4\,a^4\,(5+2m)\,\mathrm{Cos}[c+dx]^{2+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\mathrm{Cos}[c+dx]^2\right]\mathrm{Sin}[c+dx]}{d\,(2+m)\,(3+m)\sqrt{\mathrm{Sin}[c+dx]^2}}$$

Result (type 8, 23 leaves) :

$$\int \mathrm{Cos}[c+dx]^m\,(a+a\,\mathrm{Cos}[c+dx])^4\,dx$$

- **Problem 398: Unable to integrate problem.**

$$\int \mathrm{Cos}[c+dx]^m\,(a+a\,\mathrm{Cos}[c+dx])^3\,dx$$

Optimal (type 5, 232 leaves, 6 steps) :

$$\frac{a^3 (7+2m) \text{Cos}[c+d x]^{1+m} \text{Sin}[c+d x]}{d (2+m) (3+m)}+\frac{\text{Cos}[c+d x]^{1+m} \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{d (3+m)}-$$
$$\frac{a^3 (5+4m) \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (1+m) (2+m) \sqrt{\text{Sin}[c+d x]^2}}-$$
$$\frac{a^3 (11+4m) \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (2+m) (3+m) \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 8, 23 leaves) :

$$\int \text{Cos}[c+d x]^m (a+a \text{Cos}[c+d x])^3 \, dx$$

## ■ Problem 399: Unable to integrate problem.

$$\int \text{Cos}[c+d x]^m (a+a \text{Cos}[c+d x])^2 \, dx$$

Optimal (type 5, 173 leaves, 4 steps) :

$$\frac{a^2 \text{Cos}[c+d x]^{1+m} \text{Sin}[c+d x]}{d (2+m)}-\frac{a^2 (3+2m) \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (1+m) (2+m) \sqrt{\text{Sin}[c+d x]^2}}-$$
$$\frac{2 a^2 \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (2+m) \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 8, 23 leaves) :

$$\int \text{Cos}[c+d x]^m (a+a \text{Cos}[c+d x])^2 \, dx$$

## ■ Problem 400: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Cos}[c+d x]^m (a+a \text{Cos}[c+d x]) \, dx$$

Optimal (type 5, 131 leaves, 3 steps) :

$$-\frac{a \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (1+m) \sqrt{\text{Sin}[c+d x]^2}}-$$
$$\frac{a \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (2+m) \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 5, 215 leaves) :

$$\frac{1}{d(-1+m)\,m\,(1+m)} i\, 2^{-1-m} a \left(1+e^{2 i (c+d x)}\right)^{-1-m} \left(e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)\right)^{1+m} \left((-1+m)\, m\, \text{Hypergeometric2F1}\left[\frac{1}{2}(-1-m), -m, \frac{1-m}{2}, -e^{2 i (c+d x)}\right] + e^{i (c+d x)} (1+m) \left(e^{i (c+d x)} m\, \text{Hypergeometric2F1}\left[\frac{1-m}{2}, -m, \frac{3-m}{2}, -e^{2 i (c+d x)}\right] + 2(-1+m)\, \text{Hypergeometric2F1}\left[-m, -\frac{m}{2}, 1-\frac{m}{2}, -e^{2 i (c+d x)}\right]\right)\right)$$

## Problem 401: Unable to integrate problem.

$$\int \frac{\text{Cos}[c+d x]^m}{a+a\,\text{Cos}[c+d x]}\, dx$$

Optimal (type 5, 156 leaves, 4 steps):

$$\frac{\text{Cos}[c+d x]^m \text{Sin}[c+d x]}{d\,(a+a\,\text{Cos}[c+d x])} - \frac{\text{Cos}[c+d x]^m \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{m}{2}, \frac{2+m}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{a\,d\,\sqrt{\text{Sin}[c+d x]^2}} + \frac{m\,\text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{a\,d\,(1+m)\,\sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 8, 23 leaves):

$$\int \frac{\text{Cos}[c+d x]^m}{a+a\,\text{Cos}[c+d x]}\, dx$$

## Problem 402: Unable to integrate problem.

$$\int \frac{\text{Cos}[c+d x]^m}{(a+a\,\text{Cos}[c+d x])^2}\, dx$$

Optimal (type 5, 229 leaves, 5 steps):

$$-\frac{2(1-m)\,\text{Cos}[c+d x]^{1+m} \text{Sin}[c+d x]}{3 a^2 d\,(1+\text{Cos}[c+d x])} - \frac{\text{Cos}[c+d x]^{1+m} \text{Sin}[c+d x]}{3 d\,(a+a\,\text{Cos}[c+d x])^2} + \frac{(1-2m)\, m\,\text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{3 a^2 d\,(1+m)\,\sqrt{\text{Sin}[c+d x]^2}} - \frac{2(1-m)(1+m)\,\text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{3 a^2 d\,(2+m)\,\sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 8, 23 leaves):

$$\int \frac{\text{Cos}[c+d x]^m}{(a+a\,\text{Cos}[c+d x])^2}\, dx$$

## Problem 411: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 16 leaves, 2 steps):

$$b\,x+\frac{a\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}$$

Result (type 3, 73 leaves):

$$b\,x-\frac{a\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}$$

## Problem 412: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 24 leaves, 4 steps):

$$\frac{b\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}+\frac{a\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 81 leaves):

$$-\frac{b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,\mathrm{Tan}[c+d\,x]}{d}$$

## Problem 415: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 85 leaves, 6 steps):

$$\frac{3\,a\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{b\,\mathrm{Tan}[c+d\,x]}{d}+\frac{3\,a\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{8\,d}+\frac{a\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{b\,\mathrm{Tan}[c+d\,x]^3}{3\,d}$$

Result (type 3, 227 leaves):

$$-\frac{3\,a\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+\frac{3\,a\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+\frac{a}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{3\,a}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{a}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-\frac{3\,a}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{2\,b\,\mathrm{Tan}[c+d\,x]}{3\,d}+\frac{b\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d}$$

## Problem 416: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 101 leaves, 6 steps):

$$\frac{3\,b\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{a\,\mathrm{Tan}[c+d\,x]}{d}+\frac{3\,b\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{8\,d}+\frac{b\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{2\,a\,\mathrm{Tan}[c+d\,x]^3}{3\,d}+\frac{a\,\mathrm{Tan}[c+d\,x]^5}{5\,d}$$

Result (type 3, 249 leaves):

$$-\frac{3\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+\frac{3\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{b}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{3\,b}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{b}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-$$
$$\frac{3\,b}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{8\,a\,\mathrm{Tan}[c+d\,x]}{15\,d}+\frac{4\,a\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{15\,d}+\frac{a\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]}{5\,d}$$

## Problem 422: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 33 leaves, 3 steps):

$$2\,a\,b\,x+\frac{a^2\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}+\frac{b^2\,\mathrm{Sin}[c+d\,x]}{d}$$

Result (type 3, 105 leaves):

$$2\,a\,b\,x-\frac{a^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{b^2\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{d}+\frac{b^2\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}$$

## Problem 423: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 33 leaves, 4 steps):

$$b^2\,x+\frac{2\,a\,b\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}+\frac{a^2\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 77 leaves):

$$\frac{1}{d}\left(b\left(b\,c+b\,d\,x-2\,a\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+2\,a\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+a^2\,\mathrm{Tan}[c+d\,x]\right)$$

## Problem 424: Result more than twice size of optimal antiderivative.

$$\int (a + b \operatorname{Cos}[c + d x])^2 \operatorname{Sec}[c + d x]^3 \, dx$$

Optimal (type 3, 59 leaves, 5 steps):

$$\frac{(a^2 + 2 b^2) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{2 a b \operatorname{Tan}[c + d x]}{d} + \frac{a^2 \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d}$$

Result (type 3, 164 leaves):

$$\frac{1}{4 d} \left(-2 (a^2 + 2 b^2) \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 2 a^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 4 b^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \frac{a^2}{\left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{a^2}{\left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + 8 a b \operatorname{Tan}[c + d x]\right)$$

## Problem 426: Result more than twice size of optimal antiderivative.

$$\int (a + b \operatorname{Cos}[c + d x])^2 \operatorname{Sec}[c + d x]^5 \, dx$$

Optimal (type 3, 110 leaves, 6 steps):

$$\frac{(3 a^2 + 4 b^2) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{8 d} + \frac{2 a b \operatorname{Tan}[c + d x]}{d} + \frac{(3 a^2 + 4 b^2) \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{8 d} + \frac{a^2 \operatorname{Sec}[c + d x]^3 \operatorname{Tan}[c + d x]}{4 d} + \frac{2 a b \operatorname{Tan}[c + d x]^3}{3 d}$$

Result (type 3, 375 leaves):

$$-\frac{3 a^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{8 d} - \frac{b^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{3 a^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{8 d} + \frac{b^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{2 d} + \frac{a^2}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} + \frac{3 a^2}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{b^2}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{a^2}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} - \frac{3 a^2}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{b^2}{4 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{4 a b \operatorname{Tan}[c + d x]}{3 d} + \frac{2 a b \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{3 d}$$

## Problem 427: Result more than twice size of optimal antiderivative.

$$\int (a + b \operatorname{Cos}[c + d x])^2 \operatorname{Sec}[c + d x]^6 \, dx$$

Optimal (type 3, 135 leaves, 7 steps):

$$\frac{3\,a\,b\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{4\,d}+\frac{\left(4\,a^2+5\,b^2\right)\,\text{Tan}[c+d\,x]}{5\,d}+\frac{3\,a\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{4\,d}+\frac{a\,b\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{2\,d}+\frac{a^2\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}+\frac{\left(4\,a^2+5\,b^2\right)\,\text{Tan}[c+d\,x]^3}{15\,d}$$

Result (type 3, 301 leaves):

$$-\frac{3\,a\,b\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{4\,d}+\frac{3\,a\,b\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{4\,d}+\frac{a\,b}{8\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{3\,a\,b}{8\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{a\,b}{8\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-\frac{3\,a\,b}{8\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{8\,a^2\,\text{Tan}[c+d\,x]}{15\,d}+\frac{2\,b^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{4\,a^2\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{15\,d}+\frac{b^2\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a^2\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

## Problem 434: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 79 leaves, 4 steps):

$$b^3\,x+\frac{a\left(a^2+6\,b^2\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{5\,a^2\,b\,\text{Tan}[c+d\,x]}{2\,d}+\frac{a^2\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 256 leaves):

$$\frac{1}{4\,d}\text{Sec}[c+d\,x]^2\Bigg(2\,b^3\,c+2\,b^3\,d\,x-a^3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-6\,a\,b^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+a^3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+6\,a\,b^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\text{Cos}[2\,(c+d\,x)]\left(2\,b^3\,(c+d\,x)-a\left(a^2+6\,b^2\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+a\left(a^2+6\,b^2\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+2\,a^3\,\text{Sin}[c+d\,x]+6\,a^2\,b\,\text{Sin}[2\,(c+d\,x)]\Bigg)$$

## Problem 435: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 109 leaves, 6 steps):

$$\frac{b\left(3\,a^2+2\,b^2\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{a\left(2\,a^2+9\,b^2\right)\,\text{Tan}[c+d\,x]}{3\,d}+\frac{7\,a^2\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{6\,d}+\frac{a^2\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 383 leaves) :

$$\frac{\left(-3 a^2 b-2 b^3\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{\left(3 a^2 b+2 b^3\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+$$
$$\frac{a^3+9 a^2 b}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{a^3 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{a^3 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$
$$\frac{-a^3-9 a^2 b}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{2 a^3 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{2 a^3 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}$$

## Problem 436: Result more than twice size of optimal antiderivative.

$$\int (a+b \,\text{Cos}[c+d x])^3 \,\text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 133 leaves, 7 steps) :

$$\frac{3 a \left(a^2+4 b^2\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{b \left(2 a^2+b^2\right) \text{Tan}[c+d x]}{d}+$$
$$\frac{3 a \left(a^2+4 b^2\right) \text{Sec}[c+d x] \,\text{Tan}[c+d x]}{8 d}+\frac{3 a^2 b \,\text{Sec}[c+d x]^2 \,\text{Tan}[c+d x]}{4 d}+\frac{a^2 (a+b \,\text{Cos}[c+d x]) \,\text{Sec}[c+d x]^3 \,\text{Tan}[c+d x]}{4 d}$$

Result (type 3, 455 leaves) :

$$-\frac{3 \left(a^3+4 a b^2\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+\frac{3 \left(a^3+4 a b^2\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+$$
$$\frac{a^3}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{3 a^3+4 a^2 b+12 a b^2}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$
$$\frac{a^2 b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{2 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}-\frac{a^3}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{a^2 b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{2 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$
$$\frac{-3 a^3-4 a^2 b-12 a b^2}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{2 a^2 b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+b^3 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{2 a^2 b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+b^3 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}$$

## Problem 437: Result more than twice size of optimal antiderivative.

$$\int (a+b \,\text{Cos}[c+d x])^3 \,\text{Sec}[c+d x]^6 \, dx$$

Optimal (type 3, 169 leaves, 7 steps) :

$$\frac{b\left(9 a^2+4 b^2\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{a\left(4 a^2+15 b^2\right) \text{Tan}[c+d x]}{5 d}+\frac{b\left(9 a^2+4 b^2\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{8 d}+\frac{11 a^2 b \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{20 d}+\frac{a^2(a+b \text{Cos}[c+d x]) \text{Sec}[c+d x]^4 \text{Tan}[c+d x]}{5 d}+\frac{a\left(4 a^2+15 b^2\right) \text{Tan}[c+d x]^3}{15 d}$$

Result (type 3, 619 leaves) :

$$\frac{\left(-9 a^2 b-4 b^3\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d}+\frac{\left(9 a^2 b+4 b^3\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d}+$$
$$\frac{2 a^3+15 a^2 b}{80 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{19 a^3+135 a^2 b+60 a b^2+60 b^3}{240 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{a^3 \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{20 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^5}+$$
$$\frac{a^3 \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{20 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^5}+\frac{-2 a^3-15 a^2 b}{80 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{-19 a^3-135 a^2 b-60 a b^2-60 b^3}{240 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$
$$\frac{2\left(4 a^3 \text{Sin}\left[\frac{1}{2}(c+d x)\right]+15 a b^2 \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}{15 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+\frac{2\left(4 a^3 \text{Sin}\left[\frac{1}{2}(c+d x)\right]+15 a b^2 \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}{15 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+$$
$$\frac{19 a^3 \text{Sin}\left[\frac{1}{2}(c+d x)\right]+60 a b^2 \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{120 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+\frac{19 a^3 \text{Sin}\left[\frac{1}{2}(c+d x)\right]+60 a b^2 \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{120 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}$$

- **Problem 445: Result more than twice size of optimal antiderivative.**

$$\int(a+b \text{Cos}[c+d x])^4 \text{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 115 leaves, 5 steps) :

$$b^4 x+\frac{2 a b\left(a^2+2 b^2\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{d}+\frac{a^2\left(2 a^2+17 b^2\right) \text{Tan}[c+d x]}{3 d}+\frac{4 a^3 b \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 d}+\frac{a^2(a+b \text{Cos}[c+d x])^2 \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

Result (type 3, 246 leaves) :

$$\frac{1}{12\,d}\text{Sec}[c+d\,x]^3\left(9\,b\,\text{Cos}[c+d\,x]\left(b^3\,(c+d\,x)-2\,a\,(a^2+2\,b^2)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,a\,(a^2+2\,b^2)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+3\,b\,\text{Cos}[3\,(c+d\,x)]\left(b^3\,(c+d\,x)-2\,a\,(a^2+2\,b^2)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,a\,(a^2+2\,b^2)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+4\,a^2\left(2\,a^2+9\,b^2+6\,a\,b\,\text{Cos}[c+d\,x]+(a^2+9\,b^2)\,\text{Cos}[2\,(c+d\,x)]\right)\text{Sin}[c+d\,x]\right)$$

## Problem 446: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^4\,\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 154 leaves, 7 steps):

$$\frac{(3\,a^4+24\,a^2\,b^2+8\,b^4)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{8\,d}+\frac{4\,a\,b\,(2\,a^2+3\,b^2)\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a^2\,(3\,a^2+22\,b^2)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{8\,d}+\frac{5\,a^3\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{6\,d}+\frac{a^2\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 487 leaves):

$$\frac{(-3\,a^4-24\,a^2\,b^2-8\,b^4)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{(3\,a^4+24\,a^2\,b^2+8\,b^4)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{a^4}{16\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{9\,a^4+16\,a^3\,b+72\,a^2\,b^2}{48\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{2\,a^3\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{a^4}{16\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{2\,a^3\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{-9\,a^4-16\,a^3\,b-72\,a^2\,b^2}{48\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\left(2\,a^3\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a\,b^3\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{4\left(2\,a^3\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a\,b^3\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

## Problem 447: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^4\,\text{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 188 leaves, 8 steps):

$$\frac{a\,b\,\left(3\,a^2+4\,b^2\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{\left(8\,a^4+60\,a^2\,b^2+15\,b^4\right)\,\text{Tan}[c+d\,x]}{15\,d}+\frac{a\,b\,\left(3\,a^2+4\,b^2\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}+\frac{a^2\,\left(4\,a^2+27\,b^2\right)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{15\,d}+\frac{3\,a^3\,b\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{5\,d}+\frac{a^2\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

Result (type 3, 663 leaves):

$$\frac{\left(-3\,a^3\,b-4\,a\,b^3\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\frac{\left(3\,a^3\,b+4\,a\,b^3\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+$$
$$\frac{a^4+10\,a^3\,b}{40\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{19\,a^4+180\,a^3\,b+120\,a^2\,b^2+240\,a\,b^3}{240\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{a^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{20\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+$$
$$\frac{a^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{20\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+\frac{-a^4-10\,a^3\,b}{40\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{-19\,a^4-180\,a^3\,b-120\,a^2\,b^2-240\,a\,b^3}{240\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{19\,a^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+120\,a^2\,b^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{120\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{19\,a^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+120\,a^2\,b^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{120\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$
$$\frac{8\,a^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+60\,a^2\,b^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+15\,b^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{15\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{8\,a^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+60\,a^2\,b^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+15\,b^4\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{15\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

## Problem 459: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cos}[c+d\,x]^5}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 266 leaves, 7 steps):

$$-\frac{a\,\left(4\,a^2+b^2\right)\,x}{b^5}+\frac{2\,a^4\,\left(4\,a^2-5\,b^2\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{(a-b)^{3/2}\,b^5\,(a+b)^{3/2}\,d}+\frac{\left(12\,a^4-7\,a^2\,b^2-2\,b^4\right)\,\text{Sin}[c+d\,x]}{3\,b^4\,\left(a^2-b^2\right)\,d}-$$
$$\frac{a\,\left(2\,a^2-b^2\right)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{b^3\,\left(a^2-b^2\right)\,d}+\frac{\left(4\,a^2-b^2\right)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)\,d}-\frac{a^2\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 176 leaves):

$$\frac{1}{12\,b^5\,d}\left(-12\,a\,(2\,a-\mathrm{i}\,b)\,(2\,a+\mathrm{i}\,b)\,(c+d\,x)+\frac{24\,a^4\,\left(4\,a^2-5\,b^2\right)\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{\left(-a^2+b^2\right)^{3/2}}+\right.$$

$$\left.9\,b\,\left(4\,a^2+b^2\right)\,\text{Sin}[c+d\,x]+\frac{12\,a^5\,b\,\text{Sin}[c+d\,x]}{(a-b)\,(a+b)\,(a+b\,\text{Cos}[c+d\,x])}-6\,a\,b^2\,\text{Sin}[2\,(c+d\,x)]+b^3\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 491: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 197 leaves, 9 steps):

$$-\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Tan}[c+d\,x]}{d}$$

Result (type 4, 418 leaves):

$$-\frac{1}{4d}b\left(-\frac{2\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,\mathbb{i}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+\right.\right.$$

$$b\left(2\,a\,\text{EllipticF}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b\,\text{EllipticPi}\left[\frac{a+b}{a},\mathbb{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\text{Cos}[c+d\,x]^2}\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{d}$$

- **Problem 492: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 262 leaves, 10 steps) :

$$-\frac{b\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{4\,a\,d\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{3\,b\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{4\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{(4\,a^2-b^2)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{4\,a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{4\,a\,d}+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\;\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 515 leaves) :

$$\frac{1}{16\,a\,d}\left(\frac{8\,a\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,(8\,a^2-3\,b^2)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\left(2\,i\,b^2\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{b\,\text{Tan}[c+d\,x]}{4\,a}+\frac{1}{2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 498: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 209 leaves, 9 steps):

$$-\frac{a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{(a^2+2\,b^2)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{3\,a\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{d}$$

Result (type 4, 472 leaves):

$$\frac{1}{4\,d} b \Bigg( \frac{8\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}} +$$

$$\frac{10\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}} + \Bigg(2\,i\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\,\text{Cos}[2\,(c+d\,x)]$$

$$\Bigg(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right] + b\,\Bigg(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.$$

$$\left.\frac{a+b}{a-b}\right] - b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\Bigg)\Bigg)\,\text{Sin}[c+d\,x]\Bigg) \Big/$$

$$\Bigg(\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}$$

$$\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\Bigg)\Bigg) + \frac{a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{d}$$

- **Problem 499: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 255 leaves, 10 steps):

$$-\frac{5\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}} + \frac{7\,a\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}} +$$

$$\frac{\left(4\,a^2+3\,b^2\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}} + \frac{5\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{4\,d} + \frac{a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 508 leaves):

$$\frac{1}{16\,d}\left(\frac{8\,a\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(8\,a^2+b^2\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\left(10\,\mathrm{i}\,b^2\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{5}{4}\,b\,\text{Tan}[c+d\,x]+\frac{1}{2}\,a\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 504: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 4, 222 leaves, 9 steps):

$$\frac{14\,a\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{2\,b\,\left(2\,a^2+b^2\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^3\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,b^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 379 leaves):

$$\frac{1}{6\,d}\left(\frac{4\,b\,\left(9\,a^2+b^2\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,a\,\left(6\,a^2+7\,b^2\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{\sqrt{-\frac{1}{a+b}}}14\,\mathrm{i}\,\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\,\sqrt{\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{-a+b}}\;\mathrm{Csc}[c+d\,x]\left(-2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(-2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)+4\,b^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]\right)$$

## Problem 505: Result unnecessarily involves imaginary or complex numbers.

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 222 leaves, 9 steps):

$$-\frac{\left(a^2-2\,b^2\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{a\,\left(a^2+4\,b^2\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{5\,a^2\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 4, 390 leaves):

$$\frac{1}{4 d}\left(\frac{24 a b^2 \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2 b\left(9 a^2+2 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{a b \sqrt{-\frac{1}{a+b}}} 2 i\left(a^2-2 b^2\right)\right.$$

$$\sqrt{-\frac{b(-1+\operatorname{Cos}[c+d x])}{a+b}} \sqrt{-\frac{b(1+\operatorname{Cos}[c+d x])}{a-b}} \operatorname{Csc}[c+d x]\left(2 a(a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+\right.$$

$$b\left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right)+4 a^2 \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]\right)$$

- **Problem 506: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sec}[c+d x]^3 \, dx$$

Optimal (type 4, 270 leaves, 10 steps):

$$-\frac{9 a b \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{b\left(11 a^2+8 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{a\left(4 a^2+15 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{9 a b \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{4 d}+\frac{a^2 \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 4, 395 leaves):

$$\frac{1}{8 d}\left(\frac{4 b \left(a^2+4 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\right.$$

$$\frac{a \left(8 a^2+21 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{1}{\sqrt{-\frac{1}{a+b}}} 9 i \sqrt{-\frac{b(-1+\operatorname{Cos}[c+d x])}{a+b}}\ \sqrt{\frac{b(1+\operatorname{Cos}[c+d x])}{-a+b}}$$

$$\operatorname{Csc}[c+d x]\left(-2 a(a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b\left(-2 a \operatorname{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right)+$$

$$\left.2 a \sqrt{a+b \operatorname{Cos}[c+d x]}\ (2 a+9 b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]\right)$$

## Problem 507: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sec}[c+d x]^4\, dx$$

Optimal (type 4, 323 leaves, 11 steps):

$$-\frac{\left(16 a^2+33 b^2\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{a\left(16 a^2+59 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{5 b\left(4 a^2+b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{8 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(16 a^2+33 b^2\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]}{24 d}+$$

$$\frac{13 a b \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 d}+\frac{a^2 \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 563 leaves) :

$$-\frac{1}{96\,d}\left(b\left(-\frac{104\,a\,b\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}+\frac{2\,\left(-104\,a^2+3\,b^2\right)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}-\left(2\,i\,\left(16\,a^2+33\,b^2\right)\right.\right.\right.$$

$$\sqrt{\frac{b-b\,Cos[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,Cos[c+d\,x]}{a-b}}\;Cos[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\,EllipticE\left[i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+\right.$$

$$b\left(2\,a\,EllipticF\left[i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-b\,EllipticPi\left[\frac{a+b}{a},\right.\right.$$

$$\left.\left.\left.i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,Sin[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-Cos[c+d\,x]^2}\right.$$

$$\left.\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,Cos[c+d\,x])+(a+b\,Cos[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,Cos[c+d\,x])+2\,(a+b\,Cos[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,Cos[c+d\,x]}\;\left(\frac{1}{24}\,Sec[c+d\,x]\,\left(16\,a^2\,Sin[c+d\,x]+33\,b^2\,Sin[c+d\,x]\right)+\frac{13}{12}\,a\,b\,Sec[c+d\,x]\,Tan[c+d\,x]+\right.$$

$$\left.\frac{1}{3}\,a^2\,Sec[c+d\,x]^2\,Tan[c+d\,x]\right)$$

- **Problem 514: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{3+4\,Cos[c+d\,x]}\;Sec[c+d\,x]^2\,dx$$

Optimal (type 4, 95 leaves, 6 steps) :

$$-\frac{\sqrt{7}\;EllipticE\left[\frac{1}{2}\,(c+d\,x),\,\frac{8}{7}\right]}{d}+\frac{3\,EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{8}{7}\right]}{\sqrt{7}\;d}+\frac{4\,EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{8}{7}\right]}{\sqrt{7}\;d}+\frac{\sqrt{3+4\,Cos[c+d\,x]}\;Tan[c+d\,x]}{d}$$

Result (type 4, 157 leaves) :

$$\frac{1}{21\,d}\left(6\sqrt{7}\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{8}{7}\right]+1\Big/\left(\sqrt{\text{Sin}[c+d\,x]^2}\right)\mathrm{i}\sqrt{7}\left(21\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d\,x]}\right],-\frac{1}{7}\right]-12\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d\,x]}\right],-\frac{1}{7}\right]-8\,\text{EllipticPi}\left[-\frac{1}{3},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d\,x]}\right],-\frac{1}{7}\right]\right)\text{Sin}[c+d\,x]+21\sqrt{3+4\,\text{Cos}[c+d\,x]}\,\text{Tan}[c+d\,x]\right)$$

## Problem 515: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{3+4\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 135 leaves, 7 steps):

$$-\frac{\sqrt{7}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{8}{7}\right]}{3\,d}+\frac{3\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{8}{7}\right]}{\sqrt{7}\,d}+\frac{5\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{8}{7}\right]}{3\sqrt{7}\,d}+\frac{\sqrt{3+4\,\text{Cos}[c+d\,x]}\,\text{Tan}[c+d\,x]}{3\,d}+\frac{\sqrt{3+4\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 194 leaves):

$$\frac{1}{6\,d}\left(\frac{12\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{8}{7}\right]}{\sqrt{7}}+\frac{6\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{8}{7}\right]}{\sqrt{7}}+1\Big/\left(3\sqrt{7}\sqrt{\text{Sin}[c+d\,x]^2}\right)2\,\mathrm{i}\left(21\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d\,x]}\right],-\frac{1}{7}\right]-12\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d\,x]}\right],-\frac{1}{7}\right]-8\,\text{EllipticPi}\left[-\frac{1}{3},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d\,x]}\right],-\frac{1}{7}\right]\right)\text{Sin}[c+d\,x]+(3+2\,\text{Cos}[c+d\,x])\sqrt{3+4\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)$$

## Problem 521: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 98 leaves, 6 steps):

$$-\frac{\sqrt{7}\,\text{EllipticE}\left[\frac{1}{2}(c+\pi+d\,x),\frac{8}{7}\right]}{d}+\frac{3\,\text{EllipticF}\left[\frac{1}{2}(c+\pi+d\,x),\frac{8}{7}\right]}{\sqrt{7}\,d}+\frac{4\,\text{EllipticPi}\left[2,\frac{1}{2}(c+\pi+d\,x),\frac{8}{7}\right]}{\sqrt{7}\,d}+\frac{\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\text{Tan}[c+d\,x]}{d}$$

Result (type 4, 178 leaves):

$$\frac{1}{21\,d}\left(-\frac{42\,\sqrt{-3+4\,\text{Cos}[c+d\,x]}\,\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,8\right]}{\sqrt{3-4\,\text{Cos}[c+d\,x]}}-\right.$$
$$1\Big/\left(\sqrt{\text{Sin}[c+d\,x]^2}\right)\,i\,\sqrt{7}\,\left(21\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\right],\,-\frac{1}{7}\right]-12\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\right],\,-\frac{1}{7}\right]-\right.$$
$$\left.\left.8\,\text{EllipticPi}\left[-\frac{1}{3},\,i\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\right],\,-\frac{1}{7}\right]\right)\,\text{Sin}[c+d\,x]+21\,\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\,\text{Tan}[c+d\,x]\right)$$

- **Problem 522: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 138 leaves, 7 steps) :

$$\frac{\sqrt{7}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+\pi+d\,x),\,\frac{8}{7}\right]}{3\,d}-\frac{3\,\text{EllipticF}\left[\frac{1}{2}\,(c+\pi+d\,x),\,\frac{8}{7}\right]}{\sqrt{7}\,\,d}-$$
$$\frac{5\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+\pi+d\,x),\,\frac{8}{7}\right]}{3\,\sqrt{7}\,\,d}-\frac{\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\,\text{Tan}[c+d\,x]}{3\,d}+\frac{\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 237 leaves) :

$$\frac{1}{6\,d}\left(-\frac{12\,\sqrt{-3+4\,\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,8\right]}{\sqrt{3-4\,\text{Cos}[c+d\,x]}}+\frac{6\,\sqrt{-3+4\,\text{Cos}[c+d\,x]}\,\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,8\right]}{\sqrt{3-4\,\text{Cos}[c+d\,x]}}+\right.$$
$$1\Big/\left(3\,\sqrt{7}\,\,\sqrt{\text{Sin}[c+d\,x]^2}\right)\,2\,i\,\left(21\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\right],\,-\frac{1}{7}\right]-12\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\right],\,-\frac{1}{7}\right]-\right.$$
$$\left.\left.8\,\text{EllipticPi}\left[-\frac{1}{3},\,i\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\right],\,-\frac{1}{7}\right]\right)\,\text{Sin}[c+d\,x]-\sqrt{3-4\,\text{Cos}[c+d\,x]}\,\,(-3+2\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)$$

- **Problem 528: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Sec}[c+d\,x]^2}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 206 leaves, 9 steps) :

$$-\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{a\,d}$$

Result (type 4, 424 leaves) :

$$-\frac{1}{4\,a\,d}$$

$$b\left(\frac{6\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\left(2\,\mathrm{i}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\right.\right.\right.\right.$$

$$\left.\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{a\,d}$$

- **Problem 529: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\mathrm{Sec}[c+d\,x]^3}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 268 leaves, 10 steps) :

$$\frac{3\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}-\frac{b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{\left(4\,a^2+3\,b^2\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{3\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{4\,a^2\,d}+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]\;\mathrm{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 4, 518 leaves):

$$\frac{1}{16\,a^2\,d}\left(\frac{8\,a\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(8\,a^2+9\,b^2\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\left(6\,\mathrm{i}\,b^2\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\right.\right.$$

$$\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.\left.\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)$$

$$\left.\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(-\frac{3\,b\,\mathrm{Tan}[c+d\,x]}{4\,a^2}+\frac{\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a}\right)}{d}$$

- **Problem 535: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Sec}[c+d\,x]}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 176 leaves, 7 steps):

$$-\frac{2\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{2\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,b^2\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 520 leaves) :

$$\frac{2\,b^2\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{1}{2\,a\,(-a+b)\,(a+b)\,d}$$
$$\left(-\frac{4\,a\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,\left(2\,a^2-3\,b^2\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$
$$\left(2\,i\,b^2\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\,\,\text{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+\right.\right.$$
$$b\,\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-\right.$$
$$\left.\left.\left.b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$
$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)$$

## Problem 536: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Sec}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 277 leaves, 10 steps) :

$$-\frac{\left(a^2-3b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a^2\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{3b\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a^2\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\left(a^2-3b^2\right)\text{Sin}[c+d\,x]}{a^2\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\text{Tan}[c+d\,x]}{a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 551 leaves) :

$$-\frac{1}{4a^2(a-b)(a+b)d}$$

$$b\left(-\frac{8ab\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\left(7a^2-9b^2\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\left(2\,i\left(a^2-3b^2\right)\right.\right.$$

$$\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2(c+d\,x)]\left(2a(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+\right.$$

$$b\left(2a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\text{Cos}[c+d\,x]^2}\sqrt{-\frac{a^2-b^2-2a(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2a^2-b^2-4a(a+b\,\text{Cos}[c+d\,x])+2(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(-\frac{2b^3\,\text{Sin}[c+d\,x]}{a^2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])}+\frac{\text{Tan}[c+d\,x]}{a^2}\right)}{d}$$

- **Problem 537: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d\,x]^3}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 345 leaves, 11 steps) :

$$\frac{b\left(7a^2-15b^2\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{4a^3\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{5b\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{4a^2d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\left(4a^2+15b^2\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{4a^3d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{b^2\left(7a^2-15b^2\right)\mathrm{Sin}[c+d\,x]}{4a^3\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{5b\,\mathrm{Tan}[c+d\,x]}{4a^2d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2a\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 597 leaves) :

$$-\frac{1}{16a^3(-a+b)(a+b)d}$$

$$\left(\frac{2\left(4a^3b-20ab^3\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\left(8a^4+29a^2b^2-45b^4\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,i\left(7a^2b^2-15b^4\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2(c+d\,x)]\right.\left(2a(a-b)\right.$$

$$\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2a(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\left(2a^2-b^2-4a(a+b\,\mathrm{Cos}[c+d\,x])+2(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{2b^4\,\mathrm{Sin}[c+d\,x]}{a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])}-\frac{7b\,\mathrm{Tan}[c+d\,x]}{4a^3}+\frac{\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2a^2}\right)}{d}$$

- **Problem 544: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 320 leaves, 10 steps):

$$-\frac{2\,b\,(7\,a^2-3\,b^2)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{3\,a^2\,(a^2-b^2)^2\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{2\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{3\,a\,(a^2-b^2)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,b^2\,\text{Sin}[c+d\,x]}{3\,a\,(a^2-b^2)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\,b^2\,(7\,a^2-3\,b^2)\,\text{Sin}[c+d\,x]}{3\,a^2\,(a^2-b^2)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 622 leaves):

$$\frac{1}{6\,a^2\,(a-b)^2\,(a+b)^2\,d}\left(\frac{2\,\left(-12\,a^3\,b+4\,a\,b^3\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(6\,a^4-19\,a^2\,b^2+9\,b^4\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,i\,\left(-7\,a^2\,b^2+3\,b^4\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2\,b^2\,\mathrm{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,(a+b\,\mathrm{Cos}[c+d\,x])^2}+\frac{2\,\left(7\,a^2\,b^2\,\mathrm{Sin}[c+d\,x]-3\,b^4\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^2\,\left(a^2-b^2\right)^2\,(a+b\,\mathrm{Cos}[c+d\,x])}\right)}{d}$$

- **Problem 545: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\mathrm{Sec}[c+d\,x]^2}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 380 leaves, 11 steps) :

$$-\frac{\left(3 a^4-26 a^2 b^2+15 b^4\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(3 a^2-5 b^2\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{3 a^2 \left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{5 b \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{a^3 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{b \left(3 a^2-5 b^2\right) \operatorname{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right) d (a+b \operatorname{Cos}[c+d x])^{3/2}}+\frac{b \left(3 a^4-26 a^2 b^2+15 b^4\right) \operatorname{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\operatorname{Tan}[c+d x]}{a d (a+b \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 4, 638 leaves) :

$$-\frac{1}{12\,a^3\,(-a+b)^2\,(a+b)^2\,d}\,b\left(\frac{2\,\left(-36\,a^3\,b+20\,a\,b^3\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(33\,a^4-86\,a^2\,b^2+45\,b^4\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\text{i}\,\left(3\,a^4-26\,a^2\,b^2+15\,b^4\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(-\frac{2\,b^3\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{4\,\left(5\,a^2\,b^3\,\text{Sin}[c+d\,x]-3\,b^5\,\text{Sin}[c+d\,x]\right)}{3\,a^3\,\left(a^2-b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}+\frac{\text{Tan}[c+d\,x]}{a^3}\right)}{d}$$

- **Problem 552: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d\,x]^2}{\sqrt{3+4\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 101 leaves, 6 steps):

$$-\frac{\sqrt{7}\,\text{EllipticE}\left[\frac{1}{2}(c+d x),\frac{8}{7}\right]}{3 d}+\frac{\text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{8}{7}\right]}{\sqrt{7}\,d}-\frac{4\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{8}{7}\right]}{3\sqrt{7}\,d}+\frac{\sqrt{3+4\,\text{Cos}[c+d x]}\,\text{Tan}[c+d x]}{3 d}$$

Result (type 4, 158 leaves) :

$$\frac{1}{3 d}\left(-\frac{6\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{8}{7}\right]}{\sqrt{7}}+1\Big/\left(3\sqrt{7}\sqrt{\text{Sin}[c+d x]^2}\right)\,\mathrm{i}\left(21\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-12\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-8\,\text{EllipticPi}\left[-\frac{1}{3},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]\right)\text{Sin}[c+d x]+\sqrt{3+4\,\text{Cos}[c+d x]}\,\text{Tan}[c+d x]\right)$$

## Problem 553: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Sec}[c+d x]^3}{\sqrt{3+4\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 137 leaves, 7 steps) :

$$\frac{\sqrt{7}\,\text{EllipticE}\left[\frac{1}{2}(c+d x),\frac{8}{7}\right]}{3 d}-\frac{\text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{8}{7}\right]}{3\sqrt{7}\,d}+\frac{\sqrt{7}\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{8}{7}\right]}{3 d}-\frac{\sqrt{3+4\,\text{Cos}[c+d x]}\,\text{Tan}[c+d x]}{3 d}+\frac{\sqrt{3+4\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{6 d}$$

Result (type 4, 195 leaves) :

$$\frac{1}{6 d}\left(\frac{4\,\text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{8}{7}\right]}{\sqrt{7}}+\frac{18\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{8}{7}\right]}{\sqrt{7}}-1\Big/\left(3\sqrt{7}\sqrt{\text{Sin}[c+d x]^2}\right)2\,\mathrm{i}\left(21\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-12\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-8\,\text{EllipticPi}\left[-\frac{1}{3},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{3+4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]\right)\text{Sin}[c+d x]-(-1+2\,\text{Cos}[c+d x])\sqrt{3+4\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]\right)$$

## Problem 559: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Sec}[c+d x]^2}{\sqrt{3-4\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 104 leaves, 6 steps) :

$$-\frac{\sqrt{7}\ \text{EllipticE}\left[\frac{1}{2}(c+\pi+d x),\frac{8}{7}\right]}{3 d}+\frac{\text{EllipticF}\left[\frac{1}{2}(c+\pi+d x),\frac{8}{7}\right]}{\sqrt{7}\ d}-\frac{4\ \text{EllipticPi}\left[2,\frac{1}{2}(c+\pi+d x),\frac{8}{7}\right]}{3\sqrt{7}\ d}+\frac{\sqrt{3-4\,\text{Cos}[c+d x]}\ \text{Tan}[c+d x]}{3 d}$$

Result (type 4, 179 leaves):

$$\frac{1}{3 d}\left(\frac{6\sqrt{-3+4\,\text{Cos}[c+d x]}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),8\right]}{\sqrt{3-4\,\text{Cos}[c+d x]}}-1\Big/\left(3\sqrt{7}\sqrt{\text{Sin}[c+d x]^2}\right)\text{i}\left(21\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-12\,\text{EllipticF}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-8\,\text{EllipticPi}\left[-\frac{1}{3},\text{i}\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]\right)\text{Sin}[c+d x]+\sqrt{3-4\,\text{Cos}[c+d x]}\ \text{Tan}[c+d x]\right)$$

- **Problem 560: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Sec}[c+d x]^3}{\sqrt{3-4\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 140 leaves, 7 steps):

$$-\frac{\sqrt{7}\ \text{EllipticE}\left[\frac{1}{2}(c+\pi+d x),\frac{8}{7}\right]}{3 d}+\frac{\text{EllipticF}\left[\frac{1}{2}(c+\pi+d x),\frac{8}{7}\right]}{3\sqrt{7}\ d}-\frac{\sqrt{7}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+\pi+d x),\frac{8}{7}\right]}{3 d}+\frac{\sqrt{3-4\,\text{Cos}[c+d x]}\ \text{Tan}[c+d x]}{3 d}+\frac{\sqrt{3-4\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]\ \text{Tan}[c+d x]}{6 d}$$

Result (type 4, 236 leaves):

$$\frac{1}{6 d}\left(-\frac{4\sqrt{-3+4\,\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),8\right]}{\sqrt{3-4\,\text{Cos}[c+d x]}}+\frac{18\sqrt{-3+4\,\text{Cos}[c+d x]}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),8\right]}{\sqrt{3-4\,\text{Cos}[c+d x]}}-1\Big/\left(3\sqrt{7}\sqrt{\text{Sin}[c+d x]^2}\right)2\,\text{i}\left(21\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-12\,\text{EllipticF}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]-8\,\text{EllipticPi}\left[-\frac{1}{3},\text{i}\,\text{ArcSinh}\left[\sqrt{3-4\,\text{Cos}[c+d x]}\right],-\frac{1}{7}\right]\right)\text{Sin}[c+d x]+\sqrt{3-4\,\text{Cos}[c+d x]}\ (1+2\,\text{Cos}[c+d x])\ \text{Sec}[c+d x]\ \text{Tan}[c+d x]\right)$$

- **Problem 586: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d x]^{3/2}\,(a+b\,\text{Cos}[c+d x])}\,dx$$

Optimal (type 4, 77 leaves, 5 steps):

$$-\frac{2\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a\,d}-\frac{2\,b\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]}{a\,(a+b)\,d}+\frac{2\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 199 leaves) :

$$-\frac{1}{2\,a\,d}\left(\frac{6\,b\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]}{a+b}+\frac{2\,a\left(2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]-\frac{2\,a\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]}{a+b}\right)}{b}-\frac{4\,\text{Sin}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}}+1\Big/\left(a\,b\,\sqrt{\text{Sin}[c+d\,x]^2}\right)2\left(-2\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+2\,a\,(a+b)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+\left(2\,a^2-b^2\right)\text{EllipticPi}\left[-\frac{b}{a},-\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]\right)\text{Sin}[c+d\,x]\right)$$

## Problem 587: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\text{Cos}[c+d\,x]^{5/2}\,(a+b\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 128 leaves, 7 steps) :

$$\frac{2\,b\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}+\frac{2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a\,d}+\frac{2\,b^2\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]}{a^2\,(a+b)\,d}+\frac{2\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}-\frac{2\,b\,\text{Sin}[c+d\,x]}{a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 258 leaves) :

$$\frac{1}{6\,a^2\,d}\left(\frac{2\left(2\,a^2+9\,b^2\right)\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]}{a+b}+8\,a\left(2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]-\frac{2\,a\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]}{a+b}\right)+\left(6\,\text{Cos}[2\,(c+d\,x)]\left(-2\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+2\,a\,(a+b)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+\left(2\,a^2-b^2\right)\text{EllipticPi}\left[-\frac{b}{a},-\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{1-\text{Cos}[c+d\,x]^2}\,\left(-1+2\,\text{Cos}[c+d\,x]^2\right)\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\left(-\frac{2\,b\,\text{Tan}[c+d\,x]}{a^2}+\frac{2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a}\right)}{d}$$

## Problem 603: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 438 leaves, 7 steps) :

$$-\frac{1}{4\,b\,d}(a-b)\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b\,d}$$
$$\sqrt{a+b}\,(a+2\,b)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^2\,d}$$
$$\sqrt{a+b}\,\left(a^2-4\,b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{a\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d\sqrt{\text{Cos}[c+d\,x]}}+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1152 leaves) :

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+$$
$$\frac{1}{8\,d}\Bigg(-\Bigg(12\,a^2\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$
$$16\,a\,b\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$2\,a\,\Bigg(\frac{\mathrm{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## ■ Problem 604: Result more than twice size of optimal antiderivative.

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 371 leaves, 7 steps):

$$-\frac{1}{a\,d}(a-b)\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{d}-\frac{1}{b\,d}$$

$$a\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 2437 leaves):

$$\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$

$$\left(2\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.\left.b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(4\,d\left(\frac{1}{8\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,b\,(1+\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sin}[c+d\,x]\left(2\,(a+b)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\right.\right.\right.$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-4\,a\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$4\,a\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+b\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}$$

$$\left.\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\,a\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)-$$

$$\frac{1}{8\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,3\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sin}[c+d\,x]\left(2\,(a+b)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\right.$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-4\,a\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$4\,a\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+b\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}$$

$$\left.\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\,a\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)+$$

$$\frac{1}{4\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,(1+\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(2\,(a+b)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\right.$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-4\,a\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$4\,a\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+b\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}$$

$$\left.\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]+2 a\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-b\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+$$

$$\frac{1}{4\sqrt{a+b\operatorname{Cos}[c+d x]}}(1+\operatorname{Cos}[c+d x])^{3/2}\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(\frac{3}{2}b\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}\operatorname{Cos}\left[\frac{3}{2}(c+d x)\right]\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$a\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2-\frac{1}{2}b\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2+$$

$$\frac{(a+b)\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\operatorname{Sin}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}+\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Sin}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])^2}\right)}{\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}}}-$$

$$\frac{2 a\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\operatorname{Sin}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}+\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Sin}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])^2}\right)}{\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}}}-\frac{1}{\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}}}$$

$$2 a\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\operatorname{Sin}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}+\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Sin}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])^2}\right)+$$

$$\frac{b\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]\left(\frac{\operatorname{Cos}[c+d x]\operatorname{Sin}[c+d x]}{(1+\operatorname{Cos}[c+d x])^2}-\frac{\operatorname{Sin}[c+d x]}{1+\operatorname{Cos}[c+d x]}\right)\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]}{2\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}}+\frac{a\left(\frac{\operatorname{Cos}[c+d x]\operatorname{Sin}[c+d x]}{(1+\operatorname{Cos}[c+d x])^2}-\frac{\operatorname{Sin}[c+d x]}{1+\operatorname{Cos}[c+d x]}\right)\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}}-$$

$$\frac{b\left(\frac{\operatorname{Cos}[c+d x]\operatorname{Sin}[c+d x]}{(1+\operatorname{Cos}[c+d x])^2}-\frac{\operatorname{Sin}[c+d x]}{1+\operatorname{Cos}[c+d x]}\right)\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]}{2\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}}+\frac{1}{2}b\sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-$$

$$\frac{2 a\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}}\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{1-\frac{(-a+b)\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}+\frac{2 a\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}}\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{1-\frac{(-a+b)\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}+$$

$$\frac{(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\Bigg)\Bigg)\Bigg)$$

- **Problem 607: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 271 leaves, 4 steps):

$$\frac{1}{3\,a^2\,d}2\,(a-b)\,b\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 2854 leaves):

$$\frac{1}{3\,d}4\,a\left(\left(\sqrt{\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\frac{2\,a}{a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(b\,\sqrt{\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[\frac{a}{a+b},\text{ArcSin}\left[\frac{\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\frac{2\,a}{a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\left(2\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-\right.\right.$$

$$4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.\left.b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(6\,a\,d\left(\frac{1}{8\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,b\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sin}[c+d\,x]\left(2\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\right.\right.\right.$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)-$$

$$\frac{1}{8\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,3\sqrt{1+\text{Cos}[c+d\,x]}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sin}[c+d\,x]\left(2\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\right.$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]-4 a\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4 a\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]+b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Sin}\left[\frac{3}{2}(c+d x)\right]+2 a\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]-b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+$$

$$\frac{1}{4\sqrt{a+b\,\text{Cos}[c+d x]}}(1+\text{Cos}[c+d x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\left(2(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\right.$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]-4 a\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4 a\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]+b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Sin}\left[\frac{3}{2}(c+d x)\right]+2 a\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]-b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+$$

$$\frac{1}{4\sqrt{a+b\,\text{Cos}[c+d x]}}(1+\text{Cos}[c+d x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(\frac{3}{2}b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Cos}\left[\frac{3}{2}(c+d x)\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$a\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2-\frac{1}{2}b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}}$$

$$(a+b)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}+\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])^2}\right)-$$

$$\frac{2\,a\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])^2}\right)}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}}}-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}}}$$

$$2\,a\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$\frac{b\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]}{2\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}+\frac{a\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}-$$

$$\frac{b\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{2\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}+\frac{1}{2}b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$\frac{2\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+\frac{2\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+$$

$$\left.\left.\left.\frac{(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{2\,b\,\text{Tan}[c+d\,x]}{3\,a}+\frac{2}{3}\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

■ **Problem 608: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 329 leaves, 5 steps) :

$$\frac{1}{15 a^3 d} 2 (a-b) \sqrt{a+b} \left(9 a^2-2 b^2\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{15 a^2 d} 2 (a-b) \sqrt{a+b} (9 a+2 b) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{5 d \text{Cos}[c+d x]^{5/2}}+\frac{2 b \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{15 a d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1253 leaves) :

$$-\frac{1}{15 a^2 d}\left(-\left(4 a \left(2 a^2 b-2 b^3\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(9 a^3-2 a b^2\right) \left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-\right.\right.$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(9\,a^2\,b-2\,b^3\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]\left(9\,a^2\,\text{Sin}[c+d\,x]-2\,b^2\,\text{Sin}[c+d\,x]\right)}{15\,a^2}+\frac{2\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{15\,a}+\frac{2}{5}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

## Problem 609: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 389 leaves, 6 steps):

$$\frac{1}{105\,a^4\,d}2\,(a-b)\,b\,\sqrt{a+b}\,\left(19\,a^2+8\,b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(25\,a^2+6\,a\,b+8\,b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,b\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{35\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\left(25\,a^2-4\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1304 leaves):

$$\frac{1}{105\,a^3\,d}$$

$$\left(-\left(4\,a\left(25\,a^4-17\,a^2\,b^2-8\,b^4\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-19\,a^3\,b-8\,a\,b^3\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-19\,a^2\,b^2-8\,b^4\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left(b\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)+\right.$$

$$\left.\left.\frac{\sqrt{a+b\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{b\sqrt{\operatorname{Cos}[c+dx]}}\right)\right)+\frac{1}{d}\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}$$

$$\left(\frac{2\operatorname{Sec}[c+dx]^2\left(25a^2\operatorname{Sin}[c+dx]-4b^2\operatorname{Sin}[c+dx]\right)}{105a^2}+\frac{2\operatorname{Sec}[c+dx]\left(19a^2b\operatorname{Sin}[c+dx]+8b^3\operatorname{Sin}[c+dx]\right)}{105a^3}+\right.$$

$$\frac{2b\operatorname{Sec}[c+dx]^2\operatorname{Tan}[c+dx]}{35a}+$$

$$\left.\frac{2}{7}\operatorname{Sec}[c+dx]^3\operatorname{Tan}[c+dx]\right)$$

- **Problem 610: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\operatorname{Cos}[c+dx]^{3/2}(a+b\operatorname{Cos}[c+dx])^{3/2}\,dx$$

Optimal (type 4, 508 leaves, 8 steps) :

$$-\frac{1}{24\,a\,b\,d}(a-b)\sqrt{a+b}\,\left(3a^2+16b^2\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b\,d}$$

$$\sqrt{a+b}\,(a+2b)\,(3a+8b)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{8\,b^2\,d}$$

$$a\sqrt{a+b}\,\left(a^2-12b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(3a^2+16b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{a\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1189 leaves):

$$\frac{1}{48\,d}$$

$$\left(-\left(4a\left(17a^2+16b^2\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$208\,a^2\,b\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(3\,a^2+16\,b^2\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{7}{12}\,a\,\text{Sin}[c+d\,x]+\frac{1}{6}\,b\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 611: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,dx$$

Optimal (type 4, 433 leaves, 8 steps):

$$-\frac{1}{4\,d}5\,(a-b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} + \frac{1}{4\,d}$$

$$\sqrt{a+b}\,(5\,a+2\,b)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{4\,b\,d}$$

$$\sqrt{a+b}\,\left(3\,a^2+4\,b^2\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{3\,a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}} + \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1165 leaves):

$$\frac{b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d} +$$

$$\frac{1}{8\,d}\Bigg(-\Bigg(28\,a^2\,b\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\,\left(8\,a^2+4\,b^2\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$10\,a\,b\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 613: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 337 leaves, 5 steps):

$$\frac{1}{d}2\,(a-b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$2\,(a-2\,b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{d}2\,b\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 1162 leaves):

$$-\left(4 a^2 b \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b)\, d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)+$$

$$\frac{1}{d} 4 a \left(a^2-b^2\right) \left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$\frac{2 a \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{d \sqrt{\operatorname{Cos}[c+d x]}}-\frac{1}{d} 2 a b \left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}\right.+$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+dx]\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{b\sqrt{\operatorname{Cos}[c+dx]}}\right)$$

- **Problem 614: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\operatorname{Cos}[c+dx])^{3/2}}{\operatorname{Cos}[c+dx]^{5/2}}\,dx$$

Optimal (type 4, 277 leaves, 4 steps) :

$$\frac{1}{3 a d} 8 (a-b) b \sqrt{a+b} \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{3 a d}$$

$$2 (a-3 b) (a-b) \sqrt{a+b} \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 a \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1183 leaves) :

$$\frac{1}{3 d} \left(-\left(\left(4 a \left(a^2-b^2\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) +$$

$$16 a^2 b \left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$8\,b^2\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{8}{3}b\,\text{Tan}[c+d\,x]+\frac{2}{3}a\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 615: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 325 leaves, 5 steps):

$$\frac{1}{5\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(3\,a^2+b^2\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{5\,a\,d}2\,(a-b)\,(3\,a-b)\,\sqrt{a+b}\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{4\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1245 leaves):

$$-\frac{1}{5\,a\,d}\left(-\left(4\,a\,\left(-a^2\,b+b^3\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a$$

$$\left(3\,a^3+a\,b^2\right)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(3\,a^2\,b+b^3\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]\,\left(3\,a^2\,\text{Sin}[c+d\,x]+b^2\,\text{Sin}[c+d\,x]\right)}{5\,a}+\right.$$

$$\left.\frac{4}{5}\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]+\frac{2}{5}\,a\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 616: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 387 leaves, 6 steps) :

$$\frac{1}{105\,a^3\,d}4\,(a-b)\,b\sqrt{a+b}\,\left(41\,a^2-3\,b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(25\,a^2-57\,a\,b-6\,b^2\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{16\,b\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\left(25\,a^2+3\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1302 leaves) :

$$\frac{1}{105\,a^2\,d}$$

$$\left(-\left(4 a \left(25 a^4-31 a^2 b^2+6 b^4\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(-82 a^3 b+6 a b^3\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$2 \left(-82 a^2 b^2+6 b^4\right) \left(\frac{\mathrm{i} \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\mathrm{i} \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}\right.+$$

$$\frac{1}{b}2a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\Bigg(\frac{2\,\text{Sec}[c+d\,x]^2\left(25a^2\,\text{Sin}[c+d\,x]+3b^2\,\text{Sin}[c+d\,x]\right)}{105a}+\frac{4\,\text{Sec}[c+d\,x]\left(41a^2b\,\text{Sin}[c+d\,x]-3b^3\,\text{Sin}[c+d\,x]\right)}{105a^2}+$$

$$\frac{16}{35}b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\frac{2}{7}a\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\Bigg)$$

- **Problem 617: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 454 leaves, 7 steps) :

$$\frac{1}{315\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(147\,a^4+33\,a^2\,b^2+8\,b^4\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{315\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(147\,a^3-39\,a^2\,b-6\,a\,b^2-8\,b^3\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{9\,d\,\text{Cos}[c+d\,x]^{9/2}}+$$

$$\frac{20\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{63\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,\left(49\,a^2+3\,b^2\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{8\,b\,\left(22\,a^2-b^2\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1368 leaves):

$$-\frac{1}{315\,a^3\,d}\Bigg(-\Bigg(4\,a\,\left(-39\,a^4\,b+31\,a^2\,b^3+8\,b^5\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\,-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(147\,a^5+33\,a^3\,b^2+8\,a\,b^4\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\,-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(147\,a^4\,b+33\,a^2\,b^3+8\,b^5\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right.+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\text{Sec}[c+d\,x]^3\,\left(49\,a^2\,\text{Sin}[c+d\,x]+3\,b^2\,\text{Sin}[c+d\,x]\right)}{315\,a}+\right.$$

$$\frac{8\,\text{Sec}[c+d\,x]^2\,\left(22\,a^2\,b\,\text{Sin}[c+d\,x]-b^3\,\text{Sin}[c+d\,x]\right)}{315\,a^2}+$$

$$\frac{2\,\text{Sec}[c+d\,x]\,\left(147\,a^4\,\text{Sin}[c+d\,x]+33\,a^2\,b^2\,\text{Sin}[c+d\,x]+8\,b^4\,\text{Sin}[c+d\,x]\right)}{315\,a^3}+$$

$$\left.\frac{20}{63}\,b\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]+\frac{2}{9}\,a\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 618: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\left(a+b\,\text{Cos}[c+d\,x]\right)^{5/2}\,dx$$

Optimal (type 4, 506 leaves, 8 steps) :

$$-\frac{1}{24\,a\,d}(a-b)\sqrt{a+b}\,\left(33\,a^2+16\,b^2\right)\,\text{Cot}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,d}\sqrt{a+b}\,\left(33\,a^2+26\,a\,b+16\,b^2\right)\,\text{Cot}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d}5\,a\,\sqrt{a+b}\,\left(a^2+4\,b^2\right)\,\text{Cot}[c+d\,x]\;\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(33\,a^2+16\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{24\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{13\,a\,b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{12\,d}+\frac{b^2\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1203 leaves) :

$$\frac{1}{48\,d}\left(\left(-4\,a\,\left(59\,a^2\,b+16\,b^3\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(48\,a^3+76\,a\,b^2\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+\right.\right.\right.$$

$$\left.\text{d x}\right]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}}{\sqrt{2}}\right],-\frac{2\,\text{a}}{-\text{a}+\text{b}}\right]\text{Sin}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^4\Bigg)\Bigg/\left((\text{a}+\text{b})\sqrt{\text{Cos}[\text{c}+\text{d x}]}\,\sqrt{\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}]}\right)-$$

$$\Bigg(\sqrt{\frac{(\text{a}+\text{b})\,\text{Cot}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{-\text{a}+\text{b}}}\,\sqrt{-\frac{(\text{a}+\text{b})\,\text{Cos}[\text{c}+\text{d x}]\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}\,\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}\,\text{Csc}[\text{c}+\text{d x}]$$

$$\text{EllipticPi}\left[-\frac{\text{a}}{\text{b}},\text{ArcSin}\left[\frac{\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}}{\sqrt{2}}\right],-\frac{2\,\text{a}}{-\text{a}+\text{b}}\right]\text{Sin}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^4\Bigg)\Bigg/\left(\text{b}\sqrt{\text{Cos}[\text{c}+\text{d x}]}\,\sqrt{\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}]}\right)\Bigg)+$$

$$2\left(33\,\text{a}^2\,\text{b}+16\,\text{b}^3\right)\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(\text{c}+\text{d x})\right]\sqrt{\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(\text{c}+\text{d x})\right]}{\sqrt{\text{Cos}[\text{c}+\text{d x}]}}\right],-\frac{2\,\text{a}}{-\text{a}-\text{b}}\right]\text{Sec}[\text{c}+\text{d x}]}{\text{b}\sqrt{\text{Cos}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2\text{Sec}[\text{c}+\text{d x}]}\,\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Sec}[\text{c}+\text{d x}]}{\text{a}+\text{b}}}}+\right.$$

$$\frac{1}{\text{b}}2\,\text{a}\Bigg(\Bigg(\text{a}\sqrt{\frac{(\text{a}+\text{b})\,\text{Cot}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{-\text{a}+\text{b}}}\,\sqrt{-\frac{(\text{a}+\text{b})\,\text{Cos}[\text{c}+\text{d x}]\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}\,\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}\,\text{Csc}[\text{c}+\text{d x}]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}}{\sqrt{2}}\right],-\frac{2\,\text{a}}{-\text{a}+\text{b}}\right]\text{Sin}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^4\Bigg)\Bigg/\left((\text{a}+\text{b})\sqrt{\text{Cos}[\text{c}+\text{d x}]}\,\sqrt{\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}]}\right)-$$

$$\Bigg(\text{a}\sqrt{\frac{(\text{a}+\text{b})\,\text{Cot}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{-\text{a}+\text{b}}}\,\sqrt{-\frac{(\text{a}+\text{b})\,\text{Cos}[\text{c}+\text{d x}]\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}\,\sqrt{\frac{(\text{a}+\text{b}\,\text{Cos}[\text{c}+\text{d x}])\,\text{Csc}\left[\frac{1}{2}(\text{c}+\text{d x})\right]^2}{\text{a}}}\,\text{Csc}[\text{c}+\text{d x}]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{13}{12}\,a\,b\,\text{Sin}[c+d\,x]+\frac{1}{6}\,b^2\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 619: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 443 leaves, 7 steps):

$$-\frac{1}{4\,d}9\,(a-b)\,b\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,d}$$

$$\sqrt{a+b}\,\left(8\,a^2+9\,a\,b+2\,b^2\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d}$$

$$\sqrt{a+b}\,\left(15\,a^2+4\,b^2\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\ \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{9\,a\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{b^2\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1179 leaves):

$$\frac{b^2\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+$$

$$\frac{1}{8\,d}\Bigg(-\Bigg(4\,a\,\left(8\,a^3+11\,a\,b^2\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[$$

$$c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\,\left(24\,a^2\,b+4\,b^3\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+\right.\right.$$

$$d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$18\,a\,b^2\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 620: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 445 leaves, 7 steps) :

$$\frac{1}{a\,d}(a-b)\sqrt{a+b}\left(2\,a^2-b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$\sqrt{a+b}\left(2\,a^2-6\,a\,b-b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{d}5\,a\,b\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a^2\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}-\frac{\left(2\,a^2-b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1185 leaves) :

$$\frac{2\,a^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{1}{2\,d}$$

$$\Bigg(\Bigg(4\,a\,\left(-4\,a^2\,b-b^3\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a$$

$$\left(2\,a^3-6\,a\,b^2\right)\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\left(2a^2 b-b^3\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]\sqrt{a+b\,\mathrm{Cos}[c+dx]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{2a}{-a-b}\right]\mathrm{Sec}[c+dx]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]^2\mathrm{Sec}[c+dx]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Sec}[c+dx]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\;\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\;\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\;\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)$$

- **Problem 622: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+dx])^{5/2}}{\mathrm{Cos}[c+dx]^{7/2}}\,dx$$

Optimal (type 4, 338 leaves, 5 steps) :

$$\frac{1}{15\,a\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2+23\,b^2\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{15\,a\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2-8\,a\,b+15\,b^2\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,a^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{22\,a\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1248 leaves) :

$$\frac{1}{15\,d}$$

$$\Bigg(\Bigg(4\,a\,\left(-8\,a^2\,b+8\,b^3\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+4\,a$$

$$\left(9\,a^3+23\,a\,b^2\right)\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-$$

$$2\left(9\,a^2\,b+23\,b^3\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\ \left(\frac{2}{15}\text{Sec}[c+d x]\left(9a^2\,\text{Sin}[c+d x]+23 b^2\,\text{Sin}[c+d x]\right)+\frac{22}{15}a\,b\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]+\frac{2}{5}a^2\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)$$

- **Problem 623: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d x])^{5/2}}{\text{Cos}[c+d x]^{9/2}}\,dx$$

Optimal (type 4, 387 leaves, 6 steps) :

$$\frac{1}{21a^2 d}2(a-b)\,b\sqrt{a+b}\left(29a^2+3b^2\right)\text{Cot}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{21 a d}2(a-b)\sqrt{a+b}\left(5a^2-24 a b+3b^2\right)\text{Cot}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+\frac{2a^2\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{7d\,\text{Cos}[c+d x]^{7/2}}+\frac{6 a b\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{7d\,\text{Cos}[c+d x]^{5/2}}+\frac{2\left(5a^2+9b^2\right)\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{21 d\,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1302 leaves) :

$$\frac{1}{21 a d}\left(-\left(4a\left(5a^4-2a^2b^2-3b^4\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}\left[\right.\right.\right.$$

$$c + d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\Bigg) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$4 a \left(-29 a^3 b - 3 a b^3\right) \left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+\right.\right.$$

$$d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\Bigg) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\Bigg) \Big/ \left(b \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)\Bigg) +$$

$$2 \left(-29 a^2 b^2 - 3 b^4\right) \left(\frac{i \text{Cos}\left[\frac{1}{2} (c+d x)\right] \sqrt{a+b \text{Cos}[c+d x]} \text{EllipticE}\left[i \text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{\text{Cos}[c+d x]}}\right], -\frac{2 a}{-a-b}\right] \text{Sec}[c+d x]}{b \sqrt{\text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \text{Sec}[c+d x]} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Sec}[c+d x]}{a+b}}} +\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(\frac{2}{21}\,\text{Sec}[c+d\,x]^2\,\left(5\,a^2\,\text{Sin}[c+d\,x]+9\,b^2\,\text{Sin}[c+d\,x]\right)+\frac{2\,\text{Sec}[c+d\,x]\,\left(29\,a^2\,b\,\text{Sin}[c+d\,x]+3\,b^3\,\text{Sin}[c+d\,x]\right)}{21\,a}+\right.$$

$$\frac{6}{7}\,a\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\left.\frac{2}{7}\,a^2\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 624: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 454 leaves, 7 steps) :

$$\frac{1}{315 a^3 d}2 (a-b) \sqrt{a+b} \left(147 a^4+279 a^2 b^2-10 b^4\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{315 a^2 d}$$

$$2 (a-b) \sqrt{a+b} \left(147 a^3-114 a^2 b+165 a b^2+10 b^3\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 a^2 \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{9 d \text{Cos}[c+d x]^{9/2}}+\frac{38 a b \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{63 d \text{Cos}[c+d x]^{7/2}}+$$

$$\frac{2 \left(49 a^2+75 b^2\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{315 d \text{Cos}[c+d x]^{5/2}}+\frac{2 b \left(163 a^2+5 b^2\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{315 a d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1368 leaves) :

$$-\frac{1}{315 a^2 d}\left(-\left(4 a \left(-114 a^4 b+124 a^2 b^3-10 b^5\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(147 a^5+279 a^3 b^2-10 a b^4\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(147\,a^4\,b+279\,a^2\,b^3-10\,b^5\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{2}{315}\text{Sec}[c+d\,x]^3\left(49\,a^2\,\text{Sin}[c+d\,x]+75\,b^2\,\text{Sin}[c+d\,x]\right)+\right.$$
$$\frac{2\,\text{Sec}[c+d\,x]^2\left(163\,a^2\,b\,\text{Sin}[c+d\,x]+5\,b^3\,\text{Sin}[c+d\,x]\right)}{315\,a}+$$
$$\frac{2\,\text{Sec}[c+d\,x]\left(147\,a^4\,\text{Sin}[c+d\,x]+279\,a^2\,b^2\,\text{Sin}[c+d\,x]-10\,b^4\,\text{Sin}[c+d\,x]\right)}{315\,a^2}+$$
$$\frac{38}{63}\,a\,b$$
$$\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]+\frac{2}{9}$$
$$\left.a^2\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 625: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}}{\text{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 4, 522 leaves, 8 steps):

$$\frac{1}{693\,a^4\,d}2\,(a-b)\,b\sqrt{a+b}\,\left(741\,a^4+51\,a^2\,b^2+8\,b^4\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{693\,a^3\,d}2\,(a-b)\sqrt{a+b}\,\left(135\,a^4-606\,a^3\,b+57\,a^2\,b^2+6\,a\,b^3+8\,b^4\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,a^2\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{11\,d\,\text{Cos}[c+d\,x]^{11/2}}+\frac{46\,a\,b\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{99\,d\,\text{Cos}[c+d\,x]^{9/2}}+\frac{2\left(81\,a^2+113\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{693\,d\,\text{Cos}[c+d\,x]^{7/2}}+$$
$$\frac{2\,b\left(229\,a^2+3\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{693\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\left(135\,a^4+205\,a^2\,b^2-4\,b^4\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{693\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1431 leaves):

$$\frac{1}{693 a^3 d}\left(-\left(4 a \left(135 a^6-78 a^4 b^2-49 a^2 b^4-8 b^6\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(-741 a^5 b-51 a^3 b^3-8 a b^5\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$2 \left(-741 a^4 b^2-51 a^2 b^4-8 b^6\right) \left(\frac{i \operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}\right.+$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\left(\frac{2}{693}\mathrm{Sec}[c+dx]^4\left(81a^2\,\mathrm{Sin}[c+dx]+113b^2\,\mathrm{Sin}[c+dx]\right)+\right.$$

$$\frac{2\,\mathrm{Sec}[c+dx]^3\left(229a^2b\,\mathrm{Sin}[c+dx]+3b^3\,\mathrm{Sin}[c+dx]\right)}{693a}+$$

$$\frac{2\,\mathrm{Sec}[c+dx]^2\left(135a^4\,\mathrm{Sin}[c+dx]+205a^2b^2\,\mathrm{Sin}[c+dx]-4b^4\,\mathrm{Sin}[c+dx]\right)}{693a^2}+$$

$$\frac{2\,\mathrm{Sec}[c+dx]\left(741a^4b\,\mathrm{Sin}[c+dx]+51a^2b^3\,\mathrm{Sin}[c+dx]+8b^5\,\mathrm{Sin}[c+dx]\right)}{693a^3}+$$

$$\left.\frac{46}{99}ab\,\mathrm{Sec}[c+dx]^4\,\mathrm{Tan}[c+dx]+\frac{2}{11}a^2\,\mathrm{Sec}[c+dx]^5\,\mathrm{Tan}[c+dx]\right)$$

- **Problem 626: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\text{Cos}[c+d x]^{3/2}}{\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 379 leaves, 8 steps):

$$-\frac{1}{a\,b\,d}(a-b)\sqrt{a+b}\,\text{Cot}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{\sqrt{a+b}\,\text{Cot}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}}{b\,d}+\frac{1}{b^2\,d}$$
$$a\sqrt{a+b}\,\text{Cot}[c+d x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\,d\,\sqrt{\text{Cos}[c+d x]}}$$

Result (type 4, 479 leaves):

$$\frac{1}{2\,b\sqrt{\frac{a-b}{a+b}}\,d\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\sqrt{a+b\,\text{Cos}[c+d x]}}$$
$$\sqrt{\text{Cos}[c+d x]}\left(2\,i\,(a-b)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)\,(1+\text{Cos}[c+d x])}}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]-\right.$$
$$4\,i\,a\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)\,(1+\text{Cos}[c+d x])}}\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]+$$
$$4\,i\,a\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)\,(1+\text{Cos}[c+d x])}}\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]+b\sqrt{\frac{a-b}{a+b}}\,\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}$$
$$\left.\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Sin}\left[\frac{3}{2}(c+d x)\right]+2\,a\sqrt{\frac{a-b}{a+b}}\,\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]-b\sqrt{\frac{a-b}{a+b}}\,\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 629: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\text{Cos}[c+d x]^{3/2}\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 224 leaves, 3 steps):

$$\frac{1}{a^2 d}2\,(a-b)\,\sqrt{a+b}\;\mathrm{Cot}[c+d\,x]\;\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\;-$$

$$\frac{2\,\sqrt{a+b}\;\mathrm{Cot}[c+d\,x]\;\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{a\,d}$$

Result (type 4, 894 leaves):

$$\frac{1}{d}4\,a\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\,-\frac{2\,a}{-a+b}\Big]\,\mathrm{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/\Big((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\Big)\;-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\Big[-\frac{a}{b},\,\mathrm{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\,-\frac{2\,a}{-a+b}\Big]\,\mathrm{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/\Big(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\Big)\Bigg)\;+$$

$$\frac{2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{1}{a\,\sqrt{\frac{a-b}{a+b}}\;d\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\;\Bigg(2\,\mathrm{i}\,(a-b)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\Big[\mathrm{i}\,\mathrm{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,-\frac{a+b}{a-b}\Big]\;-$$

$$4\,i\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+$$

$$4\,i\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+$$

$$b\sqrt{\frac{a-b}{a+b}}\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$\left.2\,a\sqrt{\frac{a-b}{a+b}}\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\sqrt{\frac{a-b}{a+b}}\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 630: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{5/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 274 leaves, 4 steps):

$$-\frac{1}{3\,a^3\,d}4\,(a-b)\,b\,\sqrt{a+b}\;\text{Cot}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a^2\,d}$$

$$2\sqrt{a+b}\;(a+2\,b)\;\text{Cot}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1191 leaves):

$$\frac{1}{3\,a^2\,d}$$

$$\left(\left(-4\,a\,\left(a^2+2\,b^2\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$8\,a^2\,b\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$4\,b^2\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(-\frac{4\,b\,\text{Tan}[c+d\,x]}{3\,a^2}+\frac{2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a}\right)}{d}$$

- **Problem 631: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 465 leaves, 7 steps) :

$$-\frac{\left(3 a^2-b^2\right) \operatorname{Cot}[c+d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}}{a b^2 \sqrt{a+b}\, d}+$$

$$\frac{(3 a+b) \operatorname{Cot}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}}{b^2 \sqrt{a+b}\, d}+\frac{1}{b^3 d}$$

$$3 a \sqrt{a+b} \operatorname{Cot}[c+d x] \operatorname{EllipticPi}\left[\frac{a+b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}-$$

$$\frac{2 a^2 \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b\left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(3 a^2-b^2\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b^2\left(a^2-b^2\right) d \sqrt{\operatorname{Cos}[c+d x]}}$$

Result (type 4, 1201 leaves):

$$\frac{2 a^2 \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b\left(-a^2+b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{2(a-b) b(a+b) d}$$

$$\left(\left(-\left(4 a\left(a^2-b^2\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$8 a^2 b\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\middle/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(3\,a^2-b^2\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\middle/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right|+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 632: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 387 leaves, 6 steps):

$$\frac{2\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{b\,\sqrt{a+b}\,d}-$$

$$\frac{2\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{b\,\sqrt{a+b}\,d}-\frac{1}{b^2\,d}$$

$$2\,\sqrt{a+b}\,\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{2\,a^2\,\text{Sin}[c+d\,x]}{b\,(a^2-b^2)\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 985 leaves):

$$\frac{2\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{(a^2-b^2)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{1}{(a-b)\,(a+b)\,d}$$

$$\left(-4\,a\,b\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\text{Csc}[c+d\,x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$2\,a\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right.+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

### ■ Problem 634: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 267 leaves, 4 steps):

$$\frac{2\,b\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a^2\sqrt{a+b}\,d}+$$

$$\frac{2\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a\sqrt{a+b}\,d}-\frac{2\,b\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 2867 leaves):

$$\frac{1}{\left(a^2-b^2\right)d}4\,a\left(\left(\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\frac{2\,a}{a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(b\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[\frac{a}{a+b},\ \text{ArcSin}\left[\frac{\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ \frac{2\,a}{a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\frac{2\,b^2\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\Bigg(b\,\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\Bigg(2\,(a+b)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]-4\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]-4\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,\ -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]+$$

$$b\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\,a\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)\Bigg)\Bigg/$$

$$\Bigg(2\,a\,\left(a^2-b^2\right)\,d\,\Bigg(\frac{1}{8\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,b\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sin}[c+d\,x]\,\Bigg(2\,(a+b)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]-4\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]-$$

$$4\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,\ -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]+b\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\,a\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)-$$

$$\frac{1}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,3\,\sqrt{1+\text{Cos}[c+d\,x]}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sin}[c+d\,x]\,\Bigg(2\,(a+b)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$

$$\frac{1}{4\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(2\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\right.$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$

$$\frac{1}{4\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\left(\frac{3}{2}\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Cos}\left[\frac{3}{2}(c+d\,x)\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$a\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2-\frac{1}{2}\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$(a+b)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-$$

$$\frac{2\,a\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^{2}}\right)}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$2\,a\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^{2}}\right)+$$

$$\frac{b\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^{2}}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]}{2\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}+\frac{a\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^{2}}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}-$$

$$\frac{b\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^{2}}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}+\frac{1}{2}\,b\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-$$

$$\frac{2\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}\,\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a+b}}}+\frac{2\,a\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}\right)\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a+b}}}+$$

$$\left.\left.\left.\frac{(a+b)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a+b}}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}}\right)\right)\right)$$

- **Problem 635: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 285 leaves, 4 steps) :

$$\frac{2\left(a^2-2b^2\right)\text{Cot}[c+dx]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+dx])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+dx])}{a-b}}}{a^3\sqrt{a+b}\,d}-$$

$$\frac{2\,(a+2b)\,\text{Cot}[c+dx]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+dx])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+dx])}{a-b}}}{a^2\sqrt{a+b}\,d}+$$

$$\frac{2b^2\,\text{Sin}[c+dx]}{a\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+b\,\text{Cos}[c+dx]}}$$

Result (type 4, 1233 leaves) :

$$\frac{1}{a^2\,(-a+b)\,(a+b)\,d}$$

$$\left(-\left(4a\left(2a^2b-2b^3\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\text{Csc}[c+dx]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+b\,\text{Cos}[c+dx]}\right)-$$

$$4a\left(a^3-2ab^2\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\text{Csc}[c+dx]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+b\,\text{Cos}[c+dx]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(a^2\,b-2\,b^3\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\left.\left.\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \left(-\frac{2\,b^3\,\mathrm{Sin}[c+d\,x]}{a^2\,\left(a^2-b^2\right)\,(a+b\,\mathrm{Cos}[c+d\,x])}+\frac{2\,\mathrm{Tan}[c+d\,x]}{a^2}\right)}{d}$$

- **Problem 636: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 357 leaves, 5 steps):

$$-\frac{1}{3\,a^4\,\sqrt{a+b}\,d}2\,b\,\left(5\,a^2-8\,b^2\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{3\,a^3\,\sqrt{a+b}\,d}2\,(a+2\,b)\,(a+4\,b)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,b^2\,\mathrm{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(a^2-4\,b^2\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1269 leaves):

$$\frac{1}{3\,a^3\,(a-b)\,(a+b)\,d}$$

$$\left(\left(-\left(4\,a\,\left(a^4+7\,a^2\,b^2-8\,b^4\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(5\,a^3\,b-8\,a\,b^3\right)$$

$$\Bigg(\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\Big((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)\,-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\Big(b\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)\Bigg)\,+$$

$$2\,(5\,a^2\,b^2-8\,b^4)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\,+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\Big((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)\,-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right) +$$

$$\left.\left.\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right) + \frac{\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2 b^4 \operatorname{Sin}[c+d x]}{a^3 (a^2-b^2)(a+b \operatorname{Cos}[c+d x])} - \frac{10 b \operatorname{Tan}[c+d x]}{3 a^3} + \frac{2 \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{3 a^2}\right)}{d}$$

- **Problem 637: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\operatorname{Cos}[c+d x]^{7/2} (a+b \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 4, 433 leaves, 6 steps):

$$\frac{1}{5 a^5 \sqrt{a+b}\, d} 2 \left(3 a^4+8 a^2 b^2-16 b^4\right) \operatorname{Cot}[c+d x]$$

$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} - \frac{1}{5 a^4 \sqrt{a+b}\, d}$$

$$2 (3 a+4 b) \left(a^2+4 b^2\right) \operatorname{Cot}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 b^2 \operatorname{Sin}[c+d x]}{a \left(a^2-b^2\right) d \operatorname{Cos}[c+d x]^{5/2} \sqrt{a+b \operatorname{Cos}[c+d x]}} + \frac{2 \left(a^2-6 b^2\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{5 a^2 \left(a^2-b^2\right) d \operatorname{Cos}[c+d x]^{5/2}} - \frac{2 b \left(3 a^2-8 b^2\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{5 a^3 \left(a^2-b^2\right) d \operatorname{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1314 leaves):

$$\frac{1}{5 a^4 (-a+b) (a+b) d}$$

$$\left(a^2+4\,b^2\right)\Bigg(-\Bigg(4\,a\,\left(4\,a^2\,b-4\,b^3\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(3\,a^3-4\,a\,b^2\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(3\,a^2\,b-4\,b^3\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right) + \frac{1}{d}$$

$$\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(-\frac{2 b^5 \operatorname{Sin}[c+d x]}{a^4 \left(a^2-b^2\right) (a+b \operatorname{Cos}[c+d x])} + \frac{2 \operatorname{Sec}[c+d x] \left(3 a^2 \operatorname{Sin}[c+d x] + 11 b^2 \operatorname{Sin}[c+d x]\right)}{5 a^4} - \right.$$

$$\left.\frac{6 b \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{5 a^3} + \frac{2 \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{5 a^2}\right)$$

- **Problem 638: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\operatorname{Cos}[c+d x]^{5/2}}{(a+b \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 497 leaves, 7 steps):

$$\frac{2\left(3a^2-7b^2\right)\operatorname{Cot}[c+dx]\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+dx]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+dx])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+dx])}{a-b}}}{3(a-b)b^2(a+b)^{3/2}d}-\frac{1}{3(a-b)b^2(a+b)^{3/2}d}$$

$$2\left(3a^2+ab-6b^2\right)\operatorname{Cot}[c+dx]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+dx]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+dx])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+dx])}{a-b}}-$$

$$\frac{1}{b^3 d}2\sqrt{a+b}\operatorname{Cot}[c+dx]\operatorname{EllipticPi}\left[\frac{a+b}{b},\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+dx]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+dx])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+dx])}{a-b}}-$$

$$\frac{2a^2\sqrt{\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{3b\left(a^2-b^2\right)d\,(a+b\operatorname{Cos}[c+dx])^{3/2}}-\frac{2a^2\left(3a^2-7b^2\right)\operatorname{Sin}[c+dx]}{3b^2\left(a^2-b^2\right)^2 d\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}}$$

Result (type 4, 1282 leaves) :

$$\frac{\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\left(\frac{2a^2\operatorname{Sin}[c+dx]}{3b\left(-a^2+b^2\right)(a+b\operatorname{Cos}[c+dx])^2}+\frac{2\left(3a^3\operatorname{Sin}[c+dx]-7ab^2\operatorname{Sin}[c+dx]\right)}{3b\left(-a^2+b^2\right)^2(a+b\operatorname{Cos}[c+dx])}\right)}{d}-\frac{1}{3(a-b)^2 b(a+b)^2 d}$$

$$\Bigg(\Bigg(-\Bigg(4a\left(a^3-ab^2\right)\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-4a$$

$$\left(-a^2b-3b^3\right)\Bigg(\Bigg(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(3\,a^3-7\,a\,b^2\right)\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right.+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 639: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\mathrm{Cos}[c+d\,x]^{3/2}}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 342 leaves, 5 steps):

$$\frac{8\,b\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{3\,a\,(a-b)\,(a+b)^{3/2}\,d}+$$

$$\frac{2\,(a-3\,b)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{3\,a\,(a-b)\,(a+b)^{3/2}\,d}+$$

$$\frac{2\,a\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,(a^2-b^2)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}-\frac{8\,a\,b\,\mathrm{Sin}[c+d\,x]}{3\,(a^2-b^2)^2\,d\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 1237 leaves):

$$\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{2\,a\,\mathrm{Sin}[c+d\,x]}{3\,(a^2-b^2)\,(a+b\,\mathrm{Cos}[c+d\,x])^2}+\frac{8\,b^2\,\mathrm{Sin}[c+d\,x]}{3\,(a^2-b^2)^2\,(a+b\,\mathrm{Cos}[c+d\,x])}\right)}{d}+\frac{1}{3\,(a-b)^2\,(a+b)^2\,d}$$

$$\left(-\left(4\,a\,(a^2-b^2)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$16\,a^2\,b\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-$$

$$8\,b^2\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 640: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 359 leaves, 5 steps):

$$-\frac{2\left(3\,a^2+b^2\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{3\,a^2\,(a-b)\,(a+b)^{3/2}\,d}+$$

$$\frac{2\,(3\,a-b)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{3\,a\,(a-b)\,(a+b)^{3/2}\,d}-$$

$$\frac{2\,b\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\left(3\,a^2+b^2\right)\text{Sin}[c+d\,x]}{3\left(a^2-b^2\right)^2 d\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1273 leaves):

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(-\frac{2\,b\,\text{Sin}[c+d\,x]}{3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\frac{2\left(3\,a^2\,b\,\text{Sin}[c+d\,x]+b^3\,\text{Sin}[c+d\,x]\right)}{3\,a\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+\frac{1}{3\,a\,(a-b)^2\,(a+b)^2\,d}$$

$$-\Bigg(\Bigg(4\,a\,(-a^2 b+b^3)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$4\,a\,(3\,a^3+a\,b^2)\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(3\,a^2 b+b^3)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)$$

- **Problem 641: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{\operatorname{Cos}[c+d x]} (a+b \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 381 leaves, 5 steps):

$$\frac{4 b \left(3 a^2-b^2\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}}{3 a^3 (a-b) (a+b)^{3/2} d}+\frac{1}{3 a^2 (a-b) (a+b)^{3/2} d}$$

$$2 \left(3 a^2-3 a b-2 b^2\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{2 b^2 \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x])^{3/2}}-\frac{4 b \left(3 a^2-b^2\right) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right)^2 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}}$$

Result (type 4, 1296 leaves) :

$$\frac{\sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]} \left(\frac{2 b^2 \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) (a+b \text{Cos}[c+d x])^2}+\frac{4 \left(3 a^2 b^2 \text{Sin}[c+d x]-b^4 \text{Sin}[c+d x]\right)}{3 a^2 \left(a^2-b^2\right)^2 (a+b \text{Cos}[c+d x])}\right)}{d}+$$

$$\frac{1}{3 a^2 (a-b)^2 (a+b)^2 d}\left(-\left(4 a \left(3 a^4-5 a^2 b^2+2 b^4\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(-6 a^3 b+2 a b^3\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-6\,a^2\,b^2+2\,b^4\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\ \mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 642: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{1}{\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 398 leaves, 5 steps):

$$\frac{1}{3\,a^4\,(a-b)\,(a+b)^{3/2}\,d}2\left(3\,a^4-15\,a^2\,b^2+8\,b^4\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,a^3\,(a-b)\,(a+b)^{3/2}\,d}2\left(3\,a^3+9\,a^2\,b-6\,a\,b^2-8\,b^3\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,b^2\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{8\,b^2\left(2\,a^2-b^2\right)\text{Sin}[c+d\,x]}{3\,a^2\left(a^2-b^2\right)^2d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1321 leaves):

$$-\frac{1}{3\,a^3\,(a-b)^2\,(a+b)^2\,d}\left(\left(-\left(4\,a\left(9\,a^4\,b-17\,a^2\,b^3+8\,b^5\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(3\,a^5-15\,a^3\,b^2+8\,a\,b^4\right)\right.\right.$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\ \text{Cot}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\ \text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\ \text{Sin}\left[\frac{1}{2}\ (c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\ \text{Cot}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\ \text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\ \text{Sin}\left[\frac{1}{2}\ (c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(3\,a^4\,b-15\,a^2\,b^3+8\,b^5\right)\,\Bigg(\frac{\mathbb{i}\ \text{Cos}\left[\frac{1}{2}\ (c+d\,x)\right]\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\mathbb{i}\ \text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\ (c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{2\,a}{-a-b}\right]\ \text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Sec}[c+d\,x]}{a+b}}}+$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\ \text{Cot}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\ \text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}\ (c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\ \text{Sin}\left[\frac{1}{2}\ (c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\ \sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(-\frac{2\,b^3\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{2\,\left(9\,a^2\,b^3\,\text{Sin}[c+d\,x]-5\,b^5\,\text{Sin}[c+d\,x]\right)}{3\,a^3\,\left(a^2-b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}+\right.$$

$$\left.\frac{2\,\text{Tan}[c+d\,x]}{a^3}\right)$$

- **Problem 643: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{5/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 473 leaves, 6 steps) :

$$-\frac{1}{3 a^5 (a-b) (a+b)^{3/2} d}$$

$$8 b \left(2 a^4-7 a^2 b^2+4 b^4\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{1}{3 a^4 (a-b) (a+b)^{3/2} d} 2 \left(a^4+9 a^3 b+16 a^2 b^2-12 a b^3-16 b^4\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 b^2 \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \text{Cos}[c+d x]^{3/2} (a+b \text{Cos}[c+d x])^{3/2}}+$$

$$\frac{4 b^2 \left(5 a^2-3 b^2\right) \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \text{Cos}[c+d x]^{3/2} \sqrt{a+b \text{Cos}[c+d x]}}+\frac{2 \left(a^4-13 a^2 b^2+8 b^4\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1351 leaves) :

$$\frac{1}{3 a^4 (a-b)^2 (a+b)^2 d}\left(-\left(\left(4 a \left(a^6+15 a^4 b^2-32 a^2 b^4+16 b^6\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/$$

$$\left.\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)\right)-4 a \left(8 a^5 b-28 a^3 b^3+16 a b^5\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(8\,a^4\,b^2-28\,a^2\,b^4+16\,b^6\right)\left(\frac{\mathbb{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,b^4\,\text{Sin}[c+d\,x]}{3\,a^3\,\left(a^2-b^2\right)\,\left(a+b\,\text{Cos}[c+d\,x]\right)^2}+\frac{8\,\left(3\,a^2\,b^4\,\text{Sin}[c+d\,x]-2\,b^6\,\text{Sin}[c+d\,x]\right)}{3\,a^4\,\left(a^2-b^2\right)^2\,\left(a+b\,\text{Cos}[c+d\,x]\right)}-\right.$$

$$\left.\frac{16\,b\,\text{Tan}[c+d\,x]}{3\,a^4}+\frac{2\,\text{Sec}[c+d\,x]\,\,\text{Tan}[c+d\,x]}{3\,a^3}\right)$$

- **Problem 644: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{2+3\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 32 leaves, 1 step):

$$\frac{2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right],\,\frac{1}{5}\right]}{\sqrt{5}\,d}$$

Result (type 4, 131 leaves):

$$\left(2\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{2+3\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\sqrt{(2+3\,\text{Cos}[c+d\,x])\,\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\right],\,-4\right]\right)\Bigg/$$

$$\left(d\sqrt{\frac{-2-3\,\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}\right)$$

- **Problem 645: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{-2+3\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 25 leaves, 1 step):

$$\frac{2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right],\,5\right]}{d}$$

Result (type 4, 156 leaves):

$$\left(4\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{-(-2+3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\text{Csc}[c+d\,x]\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\sqrt{-(-2+3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],\frac{4}{5}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(\sqrt{5}\,d\sqrt{\text{Cos}[c+d\,x]}\sqrt{-2+3\,\text{Cos}[c+d\,x]}\right)$$

- **Problem 646: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{2-3\,\text{Cos}[c+d\,x]}\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 56 leaves, 2 steps):

$$-\frac{2\sqrt{-\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1-\text{Cos}[c+d\,x]}\right],\frac{1}{5}\right]}{\sqrt{5}\,d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 143 leaves):

$$-\left(4\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{(2-3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\text{Csc}[c+d\,x]\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\sqrt{\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],-4\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(d\sqrt{2-3\,\text{Cos}[c+d\,x]}\sqrt{\text{Cos}[c+d\,x]}\right)$$

- **Problem 647: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{-2-3\,\text{Cos}[c+d\,x]}\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 49 leaves, 2 steps):

$$-\frac{2\sqrt{-\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Sin}[c+d\,x]}{1-\text{Cos}[c+d\,x]}\right],5\right]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 153 leaves):

$$\left(4\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\ \sqrt{-\text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\ \sqrt{(2+3\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\ \text{Csc}[c+d\,x]\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\frac{5}{2}}\ \sqrt{\frac{\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}\right],\ \frac{4}{5}\right]\ \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(\sqrt{5}\ d\ \sqrt{-2-3\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Cos}[c+d\,x]}\right)$$

- **Problem 648: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 58 leaves, 1 step):

$$\frac{2\,\text{Cot}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{3+2\,\text{Cos}[c+d\,x]}}{\sqrt{5}\ \sqrt{\text{Cos}[c+d\,x]}}\right],\ -5\right]\ \sqrt{-\text{Tan}[c+d\,x]^2}}{d}$$

Result (type 4, 140 leaves):

$$\left(4\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{3+2\,\text{Cos}[c+d\,x]}\ \sqrt{-\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}}{\sqrt{6}}\right],\ 6\right]\right)\Big/$$
$$\left(d\ \sqrt{-\text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\ \sqrt{(3+2\,\text{Cos}[c+d\,x])\ \text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)$$

- **Problem 649: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{3-2\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 60 leaves, 1 step):

$$\frac{2\,\text{Cot}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{3-2\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{1}{5}\right]\ \sqrt{-\text{Tan}[c+d\,x]^2}}{\sqrt{5}\ d}$$

Result (type 4, 144 leaves):

$$\left(4\sqrt{\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{(3-2\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{-\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{-1+\mathrm{Cos}[c+d\,x]}}}{\sqrt{3}}\right],6\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(d\sqrt{3-2\,\mathrm{Cos}[c+d\,x]}\sqrt{\mathrm{Cos}[c+d\,x]}\right)$$

- **Problem 652: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{-\mathrm{Cos}[c+d\,x]}\sqrt{2+3\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 54 leaves, 2 steps):

$$\frac{2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right],\frac{1}{5}\right]}{\sqrt{5}\,d\sqrt{-\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 150 leaves):

$$-\left(4\sqrt{\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{-\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{(2+3\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{1}{2}\sqrt{(2+3\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],-4\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(d\sqrt{-\mathrm{Cos}[c+d\,x]}\sqrt{2+3\,\mathrm{Cos}[c+d\,x]}\right)$$

- **Problem 653: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{-\mathrm{Cos}[c+d\,x]}\sqrt{-2+3\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 47 leaves, 2 steps):

$$\frac{2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right],5\right]}{d\sqrt{-\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 158 leaves):

$$\left(4 \sqrt{\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{-(-2+3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2} \text{Csc}[c+d x] \right.$$
$$\left. \text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2} \sqrt{-(-2+3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}\right], \frac{4}{5}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(\sqrt{5} d \sqrt{-\text{Cos}[c+d x]} \sqrt{-2+3 \text{Cos}[c+d x]}\right)$$

- **Problem 654: Result more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{2-3 \text{Cos}[c+d x]} \sqrt{-\text{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 34 leaves, 1 step):

$$-\frac{2 \text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{1-\text{Cos}[c+d x]}\right], \frac{1}{5}\right]}{\sqrt{5} d}$$

Result (type 4, 145 leaves):

$$-\left(4 \sqrt{\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{(2-3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2} \text{Csc}[c+d x] \right.$$
$$\left. \text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2} \sqrt{\text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}\right], -4\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(d \sqrt{2-3 \text{Cos}[c+d x]} \sqrt{-\text{Cos}[c+d x]}\right)$$

- **Problem 655: Result more than twice size of optimal antiderivative.**

$$\int \frac{1}{\sqrt{-2-3 \text{Cos}[c+d x]} \sqrt{-\text{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 27 leaves, 1 step):

$$-\frac{2 \text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Sin}[c+d x]}{1-\text{Cos}[c+d x]}\right], 5\right]}{d}$$

Result (type 4, 155 leaves):

$$\left(4 \sqrt{\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{-\text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{(2+3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2} \text{Csc}[c+d x] \right.$$
$$\left. \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\frac{5}{2}} \sqrt{\frac{\text{Cos}[c+d x]}{-1+\text{Cos}[c+d x]}}\right], \frac{4}{5}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(\sqrt{5} d \sqrt{-2-3 \text{Cos}[c+d x]} \sqrt{-\text{Cos}[c+d x]}\right)$$

## Problem 658: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{-\text{Cos}[c+d x]}\ \sqrt{-3+2\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 62 leaves, 1 step):

$$-\frac{2\,\text{Cot}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{-3+2\,\text{Cos}[c+d x]}}{\sqrt{-\text{Cos}[c+d x]}}\right],-\frac{1}{5}\right]\sqrt{-\text{Tan}[c+d x]^2}}{\sqrt{5}\ d}$$

Result (type 4, 160 leaves):

$$\left(4\sqrt{-\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}\ \text{Cot}[c+d x]\sqrt{-\text{Cos}[c+d x]\ \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{-(-3+2\,\text{Cos}[c+d x])\ \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{-3+2\,\text{Cos}[c+d x]}{-1+\text{Cos}[c+d x]}}}{\sqrt{3}}\right],\frac{6}{5}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(\sqrt{5}\ d\,(-\text{Cos}[c+d x])^{3/2}\sqrt{-3+2\,\text{Cos}[c+d x]}\right)$$

## Problem 659: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{-3-2\,\text{Cos}[c+d x]}\ \sqrt{-\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 60 leaves, 1 step):

$$-\frac{2\,\text{Cot}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{-3-2\,\text{Cos}[c+d x]}}{\sqrt{5}\ \sqrt{-\text{Cos}[c+d x]}}\right],-5\right]\sqrt{-\text{Tan}[c+d x]^2}}{d}$$

Result (type 4, 155 leaves):

$$\left(4\sqrt{\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{-\text{Cos}[c+d x]\ \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{(3+2\,\text{Cos}[c+d x])\ \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}\ \text{Csc}[c+d x]\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\frac{5}{3}}\sqrt{\frac{\text{Cos}[c+d x]}{-1+\text{Cos}[c+d x]}}\right],\frac{6}{5}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(\sqrt{5}\ d\sqrt{-3-2\,\text{Cos}[c+d x]}\ \sqrt{-\text{Cos}[c+d x]}\right)$$

- **Problem 660: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Cos}[c+d x]}}{\sqrt{2+3 \text{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 77 leaves, 1 step):

$$-\frac{4 \text{Cot}[c+d x] \text{EllipticPi}\left[\frac{5}{3}, \text{ArcSin}\left[\frac{\sqrt{2+3 \text{Cos}[c+d x]}}{\sqrt{5} \sqrt{\text{Cos}[c+d x]}}\right], 5\right] \sqrt{-1-\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]}}{3 d}$$

Result (type 4, 175 leaves):

$$\left(2 \sqrt{\text{Cos}[c+d x]} \sqrt{2+3 \text{Cos}[c+d x]} \sqrt{\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2} \text{Csc}[c+d x] \left(3 \text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2} \sqrt{(2+3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}\right], -4\right] - 5 \text{EllipticPi}\left[-\frac{2}{3}, \text{ArcSin}\left[\frac{1}{2} \sqrt{(2+3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}\right], -4\right]\right)\right) \Big/ \left(3 d \sqrt{\frac{-2-3 \text{Cos}[c+d x]}{-1+\text{Cos}[c+d x]}} \sqrt{\frac{\text{Cos}[c+d x]}{-1+\text{Cos}[c+d x]}}\right)$$

- **Problem 662: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Cos}[c+d x]}}{\sqrt{2-3 \text{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 99 leaves, 2 steps):

$$-\frac{1}{3 \sqrt{5} d \sqrt{-\text{Cos}[c+d x]}} 4 \text{Cos}[c+d x]^{3/2} \text{Csc}[c+d x] \text{EllipticPi}\left[\frac{1}{3}, \text{ArcSin}\left[\frac{\sqrt{2-3 \text{Cos}[c+d x]}}{\sqrt{-\text{Cos}[c+d x]}}\right], \frac{1}{5}\right] \sqrt{-1+\text{Sec}[c+d x]} \sqrt{1+\text{Sec}[c+d x]}$$

Result (type 4, 201 leaves):

$$\left(4 \sqrt{\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2} \sqrt{\text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2} \sqrt{-(-2+3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2} \text{Csc}[c+d x] \left(3 \text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2} \sqrt{(2-3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}\right], \frac{4}{5}\right] - \text{EllipticPi}\left[\frac{2}{3}, \text{ArcSin}\left[\frac{1}{2} \sqrt{(2-3 \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}\right], \frac{4}{5}\right]\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left(3 \sqrt{5} d \sqrt{2-3 \text{Cos}[c+d x]} \sqrt{\text{Cos}[c+d x]}\right)$$

## Problem 664: Result more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{\text{Cos}[c+d\,x]}}{\sqrt{3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 73 leaves, 1 step):

$$-\frac{3\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{5}{2},\,\text{ArcSin}\left[\frac{\sqrt{3+2\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-5\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{d}$$

Result (type 4, 184 leaves):

$$\left(2\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{3+2\,\text{Cos}[c+d\,x]}\,\sqrt{-\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\text{Csc}[c+d\,x]\left(2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}{\sqrt{6}}\right],\,6\right]-5\,\text{EllipticPi}\left[-\frac{3}{2},\,\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}{\sqrt{6}}\right],\,6\right]\right)\right)\Big/\left(d\,\sqrt{-\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)$$

## Problem 665: Result more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{\text{Cos}[c+d\,x]}}{\sqrt{3-2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 75 leaves, 1 step):

$$\frac{3\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[-\frac{1}{2},\,\text{ArcSin}\left[\frac{\sqrt{3-2\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{1}{5}\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{\sqrt{5}\,d}$$

Result (type 4, 185 leaves):

$$\left(\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\frac{-3+2\,\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}\,\sqrt{-\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right.$$

$$\left(2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{-3+2\,\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}}{\sqrt{3}}\right],\,\frac{6}{5}\right]+\text{EllipticPi}\left[\frac{3}{2},\,\text{ArcSin}\left[\frac{\sqrt{\frac{-3+2\,\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}}{\sqrt{3}}\right],\,\frac{6}{5}\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)\Bigg/$$

$$\left(\sqrt{5}\,d\,\sqrt{3-2\,\text{Cos}[c+d\,x]}\,\sqrt{\frac{\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}\right)$$

- **Problem 666: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}}{\sqrt{-3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 99 leaves, 2 steps):

$$\frac{1}{\sqrt{5}\,d\,\sqrt{-\text{Cos}[c+d\,x]}}3\,\text{Cos}[c+d\,x]^{3/2}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{1}{2},\,\text{ArcSin}\left[\frac{\sqrt{-3+2\,\text{Cos}[c+d\,x]}}{\sqrt{-\text{Cos}[c+d\,x]}}\right],\,-\frac{1}{5}\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}$$

Result (type 4, 135 leaves):

$$-\left(2\,i\,\sqrt{-3+2\,\text{Cos}[c+d\,x]}\,\sqrt{\frac{\text{Cos}[c+d\,x]}{5+5\,\text{Cos}[c+d\,x]}}\right.$$

$$\left(\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{5}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{1}{5}\right]-2\,\text{EllipticPi}\left[\frac{1}{5},\,i\,\text{ArcSinh}\left[\sqrt{5}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{1}{5}\right]\right)\Bigg)\Bigg/\Bigg(d$$

$$\left.\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\frac{3-2\,\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\right)$$

- **Problem 670: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{-\text{Cos}[c+d\,x]}}{\sqrt{2-3\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 77 leaves, 1 step):

$$-\frac{4\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{1}{3},\text{ArcSin}\left[\frac{\sqrt{2-3\,\text{Cos}[c+d\,x]}}{\sqrt{-\text{Cos}[c+d\,x]}}\right],\frac{1}{5}\right]\sqrt{-1+\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{3\sqrt{5}\,d}$$

Result (type 4, 203 leaves) :

$$\left(4\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\text{Cot}[c+d\,x]\sqrt{\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right.$$
$$\sqrt{-(-2+3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(3\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\sqrt{(2-3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],\frac{4}{5}\right]-\text{EllipticPi}\left[\frac{2}{3},\right.\right.$$
$$\left.\left.\left.\text{ArcSin}\left[\frac{1}{2}\sqrt{(2-3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],\frac{4}{5}\right]\right)\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(3\sqrt{5}\,d\sqrt{2-3\,\text{Cos}[c+d\,x]}\,(-\text{Cos}[c+d\,x])^{3/2}\right)$$

- **Problem 671: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{-\text{Cos}[c+d\,x]}}{\sqrt{-2-3\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 79 leaves, 1 step) :

$$-\frac{4\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{5}{3},\text{ArcSin}\left[\frac{\sqrt{-2-3\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{-\text{Cos}[c+d\,x]}}\right],5\right]\sqrt{-1-\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]}}{3\,d}$$

Result (type 4, 194 leaves) :

$$\left(4\sqrt{\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{-\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{(2+3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right.$$
$$\text{Csc}[c+d\,x]\left(3\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\sqrt{(2+3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],-4\right]-5\right.$$
$$\left.\left.\text{EllipticPi}\left[-\frac{2}{3},\text{ArcSin}\left[\frac{1}{2}\sqrt{(2+3\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right],-4\right]\right)\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(3\,d\sqrt{-2-3\,\text{Cos}[c+d\,x]}\,\sqrt{-\text{Cos}[c+d\,x]}\right)$$

- **Problem 672: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{-\text{Cos}[c+d\,x]}}{\sqrt{3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 95 leaves, 2 steps):

$$-\frac{1}{d}3\sqrt{-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{5}{2},\text{ArcSin}\left[\frac{\sqrt{3+2\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-5\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}$$

Result (type 4, 198 leaves):

$$\left(2\sqrt{-\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{-\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right.$$
$$\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\text{Csc}[c+d\,x]\left(2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}}{\sqrt{6}}\right],6\right]-\right.$$
$$\left.\left.5\,\text{EllipticPi}\left[-\frac{3}{2},\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}}{\sqrt{6}}\right],6\right]\right)\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(d\sqrt{-\text{Cos}[c+d\,x]}\,\sqrt{3+2\,\text{Cos}[c+d\,x]}\right)$$

## Problem 673: Result more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{-\text{Cos}[c+d\,x]}}{\sqrt{3-2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 97 leaves, 2 steps):

$$\frac{1}{\sqrt{5}\,d}3\sqrt{-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{1}{2},\text{ArcSin}\left[\frac{\sqrt{3-2\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{1}{5}\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}$$

Result (type 4, 202 leaves):

$$\left(2\sqrt{-\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{-\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{-(-3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right.$$

$$\text{Csc}[c+d\,x]\left(2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{-3+2\,\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}}{\sqrt{3}}\right],\frac{6}{5}\right]+\text{EllipticPi}\left[\frac{3}{2},\text{ArcSin}\left[\frac{\sqrt{\frac{-3+2\,\text{Cos}[c+d\,x]}{-1+\text{Cos}[c+d\,x]}}}{\sqrt{3}}\right],\frac{6}{5}\right]\right)$$

$$\left.\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(\sqrt{5}\,d\,\sqrt{3-2\,\text{Cos}[c+d\,x]}\,\sqrt{-\text{Cos}[c+d\,x]}\right)$$

- **Problem 674: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{-\text{Cos}[c+d\,x]}}{\sqrt{-3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 77 leaves, 1 step):

$$\frac{3\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[-\frac{1}{2},\text{ArcSin}\left[\frac{\sqrt{-3+2\,\text{Cos}[c+d\,x]}}{\sqrt{-\text{Cos}[c+d\,x]}}\right],-\frac{1}{5}\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{\sqrt{5}\,d}$$

Result (type 4, 140 leaves):

$$\left(2\,i\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{-3+2\,\text{Cos}[c+d\,x]}\right.$$

$$\left.\left(\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{5}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{1}{5}\right]-2\,\text{EllipticPi}\left[\frac{1}{5},i\,\text{ArcSinh}\left[\sqrt{5}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{1}{5}\right]\right)\right)\Big/$$

$$\left(\sqrt{5}\,d\,\sqrt{-\text{Cos}[c+d\,x]}\,\sqrt{\frac{3-2\,\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\right)$$

- **Problem 675: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{-\text{Cos}[c+d\,x]}}{\sqrt{-3-2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 75 leaves, 1 step):

$$-\frac{3\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{5}{2},\text{ArcSin}\left[\frac{\sqrt{-3-2\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{-\text{Cos}[c+d\,x]}}\right],-5\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{d}$$

Result (type 4, 198 leaves):

$$\left(2\sqrt{-\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{-\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\right.$$
$$\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\text{Csc}[c+d\,x]\left(2\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}}{\sqrt{6}}\right],6\right]-\right.$$
$$\left.\left.5\,\text{EllipticPi}\left[-\frac{3}{2},\text{ArcSin}\left[\frac{\sqrt{(3+2\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}}{\sqrt{6}}\right],6\right]\right)\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(d\sqrt{-3-2\,\text{Cos}[c+d\,x]}\,\sqrt{-\text{Cos}[c+d\,x]}\right)$$

- **Problem 676: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{2/3}}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 6, 176 leaves, 5 steps):

$$-\frac{b\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\text{Cos}[c+d\,x]^{2/3}\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\left(\text{Cos}[c+d\,x]^2\right)^{1/3}}+$$
$$\frac{a\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\left(\text{Cos}[c+d\,x]^2\right)^{1/6}\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\,\text{Cos}[c+d\,x]^{1/3}}$$

Result (type 6, 4685 leaves):

$$\left(9\left(a^2-b^2\right)\text{Sin}[c+d\,x]\right.$$
$$\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},\right.\right.\right.$$

$$-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+2\left(3 a^2 \text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+\right.$$

$$\left.\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\right) \text{Tan}[c+d x]^2\Big)+$$

$$\left(b \text{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\right)\Big/\left(-9\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+\right.$$

$$\left(6 a^2 \text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+\right.$$

$$\left.\left.\left.\left.5\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{3}{2},\frac{11}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\right) \text{Tan}[c+d x]^2\right)\right)\right)\Big/$$

$$\left(d \text{Cos}[c+d x]^{1/3}(a+b \text{Cos}[c+d x])\left(1+\text{Tan}[c+d x]^2\right)^{5/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)\right)$$

$$\left(-\frac{1}{\left(1+\text{Tan}[c+d x]^2\right)^{5/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2}\right.$$

$$18 a^2\left(a^2-b^2\right) \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2\left(-\left(a \text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\right.$$

$$\left(-9\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+2\left(3 a^2 \text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.$$

$$\left.\left.-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\right) \text{Tan}[c+d x]^2\right)+$$

$$\left(b \text{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\right)\Big/\left(-9\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,\right.$$

$$-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+\left(6 a^2 \text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+\right.$$

$$\left.\left.\left.5\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{3}{2},\frac{11}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\right) \text{Tan}[c+d x]^2\right)\right)-$$

$$\frac{1}{\left(1+\text{Tan}[c+d x]^2\right)^{11/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)} 15\left(a^2-b^2\right) \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2$$

$$\left(-\left(a \text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\right.$$

$$\left(-9\left(a^2-b^2\right) \text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]+2\left(3 a^2 \text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)+$$

$$\Big(b \operatorname{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big)\Big/\Big(-9\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+\Big(6 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+5\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{11}{6},$$

$$1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)\Big)+\frac{1}{\left(1+\operatorname{Tan}[c+d x]^2\right)^{5/6}\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d x]^2\right)\right)}$$

$$9\left(a^2-b^2\right) \operatorname{Sec}[c+d x]^2\Big(-\Big(a \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \sqrt{1+\operatorname{Tan}[c+d x]^2}\Big)\Big/$$

$$\Big(-9\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+2\Big(3 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)+$$

$$\Big(b \operatorname{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big)\Big/\Big(-9\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+\Big(6 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+5\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{11}{6},$$

$$1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)\Big)+\frac{1}{\left(1+\operatorname{Tan}[c+d x]^2\right)^{5/6}\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d x]^2\right)\right)}$$

$$9\left(a^2-b^2\right) \operatorname{Tan}[c+d x]\Big(-\Big(a \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Big)\Big/$$

$$\Big(\sqrt{1+\operatorname{Tan}[c+d x]^2}\Big(-9\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+2\Big(3 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},$$

$$-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)\Big)-$$

$$\Big(a\Big(-\frac{2 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3\left(a^2-b^2\right)}-\frac{2}{9} \operatorname{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,$$

$$\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Big) \sqrt{1+\operatorname{Tan}[c+d x]^2}\Big)\Big/$$

$$\Big(-9\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\,\Big(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)+$$

$$\Big(b\,\Big(-\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,(a^2-b^2)}-\frac{5}{9}\,\text{AppellF1}\Big[\frac{3}{2},\frac{11}{6},$$

$$1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)\Big)\Big/$$

$$\Big(-9\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+5\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{3}{2},\frac{11}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)+$$

$$\Big(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\sqrt{1+\text{Tan}[c+d\,x]^2}\,\Big(4\,\Big(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\,(a^2-b^2)\,\Big(-\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,(a^2-b^2)}-$$

$$\frac{2}{9}\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)+$$

$$2\,\text{Tan}[c+d\,x]^2\,\Big(3\,a^2\,\Big(-\frac{1}{5\,(a^2-b^2)}12\,a^2\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{3},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{2}{5}\,\text{AppellF1}\Big[\frac{5}{2},\frac{4}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)+$$

$$(a^2-b^2)\,\Big(-\frac{1}{5\,(a^2-b^2)}6\,a^2\,\text{AppellF1}\Big[\frac{5}{2},\frac{4}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{8}{5}\,\text{AppellF1}\Big[\frac{5}{2},\frac{7}{3},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)\Big)\Big)\Big)\Big/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+2\left(3 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)^2-$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\left(2\left(6 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.\right.$$

$$\left.5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{11}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-$$

$$9\left(a^2-b^2\right)\left(-\frac{2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3\left(a^2-b^2\right)}-\right.$$

$$\left.\frac{5}{9}\,\text{AppellF1}\left[\frac{3}{2},\frac{11}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\text{Tan}[c+d x]^2\left(6 a^2\left(-\frac{1}{5\left(a^2-b^2\right)}12 a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{6},3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{5}{2},\frac{11}{6},2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$5\left(a^2-b^2\right)\left(-\frac{1}{5\left(a^2-b^2\right)}6 a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{11}{6},2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\left.\left.\left.\frac{11}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{17}{6},1,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)\right)\right)\right)\Big/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(6 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{11}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)^2\Bigg)\Bigg)\Bigg)$$

- **Problem 677: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{1/3}}{a+b\,\text{Cos}[c+d x]}\,dx$$

Optimal (type 6, 176 leaves, 5 steps):

$$-\frac{b\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\text{Cos}[c+d\,x]^{1/3}\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\left(\text{Cos}[c+d\,x]^2\right)^{1/6}}+\frac{a\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\left(\text{Cos}[c+d\,x]^2\right)^{1/3}\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\,\text{Cos}[c+d\,x]^{2/3}}$$

Result (type 6, 4684 leaves) :

$$\Bigg(9\left(a^2-b^2\right)\text{Sin}[c+d\,x]$$

$$\Bigg(-\left(a\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/\Bigg(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},\right.$$

$$\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)+$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\Bigg(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$2\Bigg(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$2\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(d\,\text{Cos}[c+d\,x]^{2/3}\,(a+b\,\text{Cos}[c+d\,x])\left(1+\text{Tan}[c+d\,x]^2\right)^{2/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)$$

$$\Bigg(-\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{2/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2}$$

$$18\,a^2\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\Bigg(-\left(a\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/$$

$$\Bigg(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)+$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\Bigg(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big] + 2\left(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\right.$$

$$\left.\left.2\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{5}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\text{Tan}[c+d\,x]^2\right)\right)-$$

$$\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{5/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}\,12\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2$$

$$\left(-\left(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\right/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.$$

$$\left.\left.-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\text{Tan}[c+d\,x]^2\right)+$$

$$\left(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\left(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{5}{3},\right.$$

$$\left.\left.\left.1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\text{Tan}[c+d\,x]^2\right)\right)+\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{2/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}$$

$$9\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\left(-\left(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\right/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.$$

$$\left.\left.-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\text{Tan}[c+d\,x]^2\right)+$$

$$\left(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\left(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{5}{3},\right.$$

$$\left.\left.\left.1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\right)\text{Tan}[c+d\,x]^2\right)\right)+\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{2/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}$$

$$9\left(a^2-b^2\right)\text{Tan}[c+d\,x]\left(-\left(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2 \text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right/$$

$$\left(\sqrt{1+\text{Tan}[c+d\,x]^2}\;\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{6},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{6},\,2,\,\frac{5}{2},\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{6},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\right)-$$

$$\left(a\left(-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{6},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}-\frac{1}{9}\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{6},\,1,\right.\right.\right.$$

$$\left.\left.\left.\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{6},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{6},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{6},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)+$$

$$\left(b\left(-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2}{3},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}-\frac{4}{9}\,\text{AppellF1}\left[\frac{3}{2},\,\frac{5}{3},\right.\right.\right.$$

$$\left.\left.\left.1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\Big/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\,\frac{2}{3},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2}{3},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{5}{3},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)+$$

$$\left(a\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{6},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\;\left(2\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{6},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{6},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\left(a^2-b^2\right)\left(-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{6},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}-\right.$$

$$\left.\frac{1}{9}\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{6},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\text{Tan}[c+d\,x]^2\left(6\,a^2\left(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{6},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{1}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{6},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{6},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{7}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{13}{6},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2-$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\left(4\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.\right.$$

$$\left.2\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\left(a^2-b^2\right)\left(-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}-\right.$$

$$\left.\frac{4}{9}\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$2\,\text{Tan}[c+d\,x]^2\left(3\,a^2\left(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{4}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$2\left(a^2-b^2\right)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.2\,\text{AppellF1}\left[\frac{5}{2},\frac{8}{3},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+2\left(3 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.$$
$$\left.\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+2\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)^2\right)\right)\right)$$

## Problem 678: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\text{Cos}[c+d x]^{1/3}\,(a+b\,\text{Cos}[c+d x])}\,dx$$

Optimal (type 6, 176 leaves, 5 steps):

$$-\frac{b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},\text{Sin}[c+d x]^2,-\frac{b^2\,\text{Sin}[c+d x]^2}{a^2-b^2}\right]\left(\text{Cos}[c+d x]^2\right)^{1/6}\text{Sin}[c+d x]}{\left(a^2-b^2\right)d\,\text{Cos}[c+d x]^{1/3}}+$$
$$\frac{a\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3},1,\frac{3}{2},\text{Sin}[c+d x]^2,-\frac{b^2\,\text{Sin}[c+d x]^2}{a^2-b^2}\right]\left(\text{Cos}[c+d x]^2\right)^{2/3}\text{Sin}[c+d x]}{\left(a^2-b^2\right)d\,\text{Cos}[c+d x]^{4/3}}$$

Result (type 6, 4676 leaves):

$$\left(9\left(a^2-b^2\right)\text{Sin}[c+d x]\right.$$
$$\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},\right.\right.\right.$$
$$-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(6 a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)+$$
$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$2\left(3 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\right)\right)\Big/$$
$$\left(d\,\text{Cos}[c+d x]^{4/3}\,(a+b\,\text{Cos}[c+d x])\left(1+\text{Tan}[c+d x]^2\right)^{1/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)\right)$$

$$\left(-\frac{1}{\left(1+\text{Tan}[c+d x]^2\right)^{1/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2}\right.$$

$$18 a^2\left(a^2-b^2\right)\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]^2\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\right.$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(6 a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)+$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,\right.\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+2\left(3 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\right)-$$

$$\frac{1}{\left(1+\text{Tan}[c+d x]^2\right)^{4/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)}6\left(a^2-b^2\right)\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]^2$$

$$\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\right.$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(6 a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{6},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)+$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d x]^2,\right.\right.$$

$$-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+2\left(3 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3},\right.\right.$$

$$\left.\left.\left.1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\right)+\frac{1}{\left(1+\text{Tan}[c+d x]^2\right)^{1/3}\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)}$$

$$9\left(a^2-b^2\right)\text{Sec}[c+d x]^2\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\right.$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(6 a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(-a^2+b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{5}{6}, 1, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big) +$$

$$\Big(b \operatorname{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}, 1, \frac{3}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \Big/ \Big(-9 \left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}, 1, \frac{3}{2}, -\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + 2 \Big(3 a^2 \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}, 2, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{4}{3},$$

$$1, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)\Big) + \frac{1}{\left(1+\operatorname{Tan}[c+d x]^2\right)^{1/3} \left(-b^2+a^2 \left(1+\operatorname{Tan}[c+d x]^2\right)\right)}$$

$$9 \left(a^2-b^2\right) \operatorname{Tan}[c+d x] \Bigg(-\Big(a \operatorname{AppellF1}\Big[\frac{1}{2}, -\frac{1}{6}, 1, \frac{3}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Big) \Big/ \Big(\sqrt{1+\operatorname{Tan}[c+d x]^2}$$

$$\Big(-9 \left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2}, -\frac{1}{6}, 1, \frac{3}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \Big(6 a^2 \operatorname{AppellF1}\Big[\frac{3}{2}, -\frac{1}{6}, 2, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(-a^2+b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{5}{6}, 1, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big)\Big) -$$

$$\Bigg(a \Bigg(-\frac{2 a^2 \operatorname{AppellF1}\Big[\frac{3}{2}, -\frac{1}{6}, 2, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 \left(a^2-b^2\right)} + \frac{1}{9} \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{5}{6},$$

$$1, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Bigg) \sqrt{1+\operatorname{Tan}[c+d x]^2}\Bigg) \Big/$$

$$\Big(-9 \left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2}, -\frac{1}{6}, 1, \frac{3}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \Big(6 a^2 \operatorname{AppellF1}\Big[\frac{3}{2}, -\frac{1}{6}, 2, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(-a^2+b^2\right) \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{5}{6}, 1, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \operatorname{Tan}[c+d x]^2\Big) +$$

$$\Bigg(b \Bigg(-\frac{2 a^2 \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}, 2, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 \left(a^2-b^2\right)} - \frac{2}{9} \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{4}{3},$$

$$1, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Bigg)\Bigg) \Big/$$

$$\Big(-9 \left(a^2-b^2\right) \operatorname{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}, 1, \frac{3}{2}, -\operatorname{Tan}[c+d x]^2, -\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + 2 \Big(3 a^2 \operatorname{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}, 2, \frac{5}{2}, -\operatorname{Tan}[c+d x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)+$$

$$\Big(a\,\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\;\Big(2\,\Big(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(-a^2+b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\left(a^2-b^2\right)\Big(-\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\frac{1}{9}\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)+$$

$$\text{Tan}[c+d\,x]^2\,\Big(6\,a^2\,\Big(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\Big[\frac{5}{2},-\frac{1}{6},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\frac{1}{5}\,\text{AppellF1}\Big[\frac{5}{2},\frac{5}{6},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)+$$

$$\left(-a^2+b^2\right)\Big(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\Big[\frac{5}{2},\frac{5}{6},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\text{AppellF1}\Big[\frac{5}{2},\frac{11}{6},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)\Big)\Big)\Big)\Big/$$

$$\Big(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(-a^2+b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{5}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)^2-$$

$$\Big(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\;\Big(4\,\Big(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\left(a^2-b^2\right)\Big(-\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}-$$

$$\frac{2}{9}\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)+$$

$$2\,\text{Tan}[c+d\,x]^2\left(3\,a^2\left(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{2}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+\left(a^2-b^2\right)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{8}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{3},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Bigg/$$

$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2\right)\right)\right)$$

## Problem 679: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{\text{Cos}[c+d\,x]^{2/3}\,(a+b\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 6, 176 leaves, 5 steps):

$$-\frac{b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\left(\text{Cos}[c+d\,x]^2\right)^{1/3}\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\,\text{Cos}[c+d\,x]^{2/3}}+\frac{a\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{6},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\left(\text{Cos}[c+d\,x]^2\right)^{5/6}\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)d\,\text{Cos}[c+d\,x]^{5/3}}$$

Result (type 6, 4679 leaves):

$$\Bigg(9\left(a^2-b^2\right)\text{Sin}[c+d\,x]$$

$$\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Bigg/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)+\right.$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$
$$\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)$$
$$\left.\left.\left.\text{Tan}[c+d\,x]^2\right)\right)\right)\Big/$$
$$\left(d\,\text{Cos}[c+d\,x]^{5/3}\,(a+b\,\text{Cos}[c+d\,x])\left(1+\text{Tan}[c+d\,x]^2\right)^{1/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right.$$
$$\left(-\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{1/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2}\right.$$
$$18\,a^2\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/\right.$$
$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)+$$
$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.\right.$$
$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\right)-$$
$$\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{7/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}\,3\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2$$
$$\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/\right.$$
$$\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)+$$
$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\left(-9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.\right.$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{7}{6},$$

$$1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\Big)+\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{1/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}$$

$$9\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\Big(-\Big(a\,\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\Big)\Big/$$

$$\Big(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\,\Big(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(-a^2+b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)+$$

$$\Big(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\Big/\Big(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(6\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{7}{6},$$

$$1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\Big)+\frac{1}{\left(1+\text{Tan}[c+d\,x]^2\right)^{1/6}\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}$$

$$9\left(a^2-b^2\right)\text{Tan}[c+d\,x]\,\Big(-\Big(a\,\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)\Big/\Big(\sqrt{1+\text{Tan}[c+d\,x]^2}$$

$$\Big(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\,\Big(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(-a^2+b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\Big)-$$

$$\Big(a\,\Big(-\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}+\frac{2}{9}\,\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},$$

$$1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)\sqrt{1+\text{Tan}[c+d\,x]^2}\Big)\Big/$$

$$\Big(-9\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\,\Big(3\,a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},$$

$$-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(-a^2+b^2\right)\text{AppellF1}\Big[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)+$$

$$\left(b\left(-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,(a^2-b^2)}-\frac{1}{9}\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},\right.\right.\right.$$

$$\left.\left.\left.1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\Big/$$

$$\left(-9\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)+$$

$$\left(a\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\,\left(4\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+(-a^2+b^2)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\,(a^2-b^2)\,\left(-\frac{1}{3\,(a^2-b^2)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\right.$$

$$\left.\frac{2}{9}\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$2\,\text{Tan}[c+d\,x]^2\,\left(3\,a^2\,\left(-\frac{1}{5\,(a^2-b^2)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},-\frac{1}{3},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\right.\right.$$

$$\left.\frac{2}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$(-a^2+b^2)\,\left(-\frac{1}{5\,(a^2-b^2)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{4}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(-9\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{3},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\left(3\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{1}{3},2,\frac{5}{2},\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+(-a^2+b^2)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2-$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\left(2\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.\right.$$

$$\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$9\left(a^2-b^2\right)\left(-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}-\right.$$

$$\left.\frac{1}{9}\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\text{Tan}[c+d\,x]^2\left(6\,a^2\left(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{6},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{1}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{6},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{6},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{7}{5}\,\text{AppellF1}\left[\frac{5}{2},\frac{13}{6},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(-9\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{6},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(6\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{6},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{6},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)^2\Bigg)\Bigg)\Bigg)$$

- **Problem 681: Attempted integration timed out after 120 seconds.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/3}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 9, 27 leaves, 0 steps):

$$\text{Unintegrable}\left[\frac{\text{Cos}[c+d\,x]^{5/3}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}},x\right]$$

Result (type 1, 1 leaves):

???

- **Problem 687: Attempted integration timed out after 120 seconds.**

$$\int\frac{1}{\text{Cos}[c+d\,x]^{4/3}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 9, 27 leaves, 0 steps):

$$\text{Unintegrable}\left[\frac{1}{\text{Cos}[c+d\,x]^{4/3}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}},\,x\right]$$

Result (type 1, 1 leaves):

???

## Problem 689: Attempted integration timed out after 120 seconds.

$$\int \frac{1}{\text{Cos}[c+d\,x]^{7/3}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 9, 27 leaves, 0 steps):

$$\text{Unintegrable}\left[\frac{1}{\text{Cos}[c+d\,x]^{7/3}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}},\,x\right]$$

Result (type 1, 1 leaves):

???

## Problem 719: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 277 leaves, 11 steps):

$$-\frac{\left(2\,a^2-3\,b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{a^2\,\left(a^2-b^2\right)\,d}+$$

$$\frac{b\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{a\,\left(a^2-b^2\right)\,d}-\frac{b\,\left(5\,a^2-3\,b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{a^2\,(a-b)\,(a+b)^2\,d}+$$

$$\frac{\left(2\,a^2-3\,b^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{a^2\,\left(a^2-b^2\right)\,d}+\frac{b^2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,(b+a\,\text{Sec}[c+d\,x])}$$

Result (type 4, 635 leaves):

$$\frac{\sqrt{\operatorname{Sec}[c+d x]}\left(\frac{\left(2 a^2-3 b^2\right) \operatorname{Sin}[c+d x]}{a^2\left(a^2-b^2\right)}+\frac{b^2 \operatorname{Sin}[c+d x]}{a\left(a^2-b^2\right)(a+b \operatorname{Cos}[c+d x])}\right)}{d}-\frac{1}{4 a^2(a-b)(a+b) d}$$

$$\left(-\left(2\left(4 a^3-8 a b^2\right) \operatorname{Cos}[c+d x]^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right](b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2} \operatorname{Sin}[c+d x]\right)\right/$$
$$\left(b(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right)\right)+$$
$$\left(2\left(10 a^2 b-9 b^3\right) \operatorname{Cos}[c+d x]^2\left(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]+\operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]\right)\right.$$
$$\left.(b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2} \operatorname{Sin}[c+d x]\right) \Big/ \left(a(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right)\right)+$$
$$\left(\left(2 a^2 b-3 b^3\right) \operatorname{Cos}[2(c+d x)](b+a \operatorname{Sec}[c+d x])\left(-4 a b+4 a b \operatorname{Sec}[c+d x]^2-4 a b \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]\right.\right.$$
$$\sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+2(2 a-b) b \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+$$
$$4 a^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}-$$
$$\left.2 b^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}\right) \operatorname{Sin}[c+d x]\Big) \Big/$$
$$\left.\left(a b^2(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right) \sqrt{\operatorname{Sec}[c+d x]}\left(2-\operatorname{Sec}[c+d x]^2\right)\right)\right)$$

- **Problem 720: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Sec}[c+d x]}}{(a+b \operatorname{Cos}[c+d x])^2} \, dx$$

Optimal (type 4, 217 leaves, 10 steps):

$$-\frac{b \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a\left(a^2-b^2\right) d}-\frac{\sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{\left(a^2-b^2\right) d}+$$
$$\frac{\left(3 a^2-b^2\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a(a-b)(a+b)^2 d}+\frac{b^2 \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{a\left(a^2-b^2\right) d(b+a \operatorname{Sec}[c+d x])}$$

Result (type 4, 590 leaves):

$$\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{b\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)}+\frac{b\,\text{Sin}[c+d\,x]}{\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+$$

$$\frac{1}{4\,a\,(-a+b)\,(a+b)\,d}\left(-\left(8\,a\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\Big/\right.$$

$$\left((a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$

$$\left(2\,\left(-4\,a^2+3\,b^2\right)\,\text{Cos}[c+d\,x]^2\,\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]+\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\right)\right.$$

$$\left.(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$

$$\left(\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\left(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\right.\right.$$

$$\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$

$$4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$

$$\left.2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\right)\,\text{Sin}[c+d\,x]\Big)\Big/$$

$$\left.\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\right)$$

## ■ Problem 721: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 208 leaves, 10 steps):

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{\left(a^2-b^2\right)\,d}+\frac{a\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b\,\left(a^2-b^2\right)\,d}-$$

$$\frac{\left(a^2+b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{(a-b)\,b\,(a+b)^2\,d}-\frac{b\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)\,d\,(b+a\,\text{Sec}[c+d\,x])}$$

Result (type 4, 580 leaves):

$$\frac{\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{\text{Sin}[c+d\,x]}{a^2-b^2}+\frac{a\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+$$

$$\frac{1}{4\,(a-b)\,(a+b)\,d}\left(-\left(8\,a\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\Big/\right.$$
$$\left(b\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)-$$
$$\left(2\,b\,\text{Cos}[c+d\,x]^2\,\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]+\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\right)\right.$$
$$\left.(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$
$$\left(\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\left(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\right.\right.$$
$$\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$
$$4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$\left.2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\right)\text{Sin}[c+d\,x]\Bigg)\Big/$$
$$\left.\left(a\,b\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\right)$$

## ■ Problem 722: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 223 leaves, 10 steps):

$$-\frac{a\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{b\,\left(a^2-b^2\right)\,d}+\frac{\left(a^2-2\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{b^2\,\left(a^2-b^2\right)\,d}-$$
$$\frac{a\,\left(a^2-3\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{(a-b)\,b^2\,(a+b)^2\,d}+\frac{a\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{\left(a^2-b^2\right)\,d\,(b+a\,\text{Sec}[c+d\,x])}$$

Result (type 4, 577 leaves):

$$\frac{\sqrt{\text{Sec}[c+d\,x]}\left(\frac{a\,\text{Sin}[c+d\,x]}{b\,(a^2-b^2)}+\frac{a^2\,\text{Sin}[c+d\,x]}{b\,(-a^2+b^2)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+$$

$$\frac{1}{4\,(-a+b)\,(a+b)\,d}\Bigg(-\Bigg(8\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Big/$$
$$((a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2))-$$
$$\Bigg(2\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)$$
$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Big/\,((a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2))+$$
$$\Bigg(\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}$$
$$\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$
$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Bigg)\Big/$$
$$\Big(b^2\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\,\sqrt{\text{Sec}[c+d\,x]}\,(2-\text{Sec}[c+d\,x]^2)\Big)\Bigg)$$

- **Problem 723: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 245 leaves, 10 steps):

$$\frac{(3\,a^2-2\,b^2)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\Big[\frac{1}{2}\,(c+d\,x),\,2\Big]\,\sqrt{\text{Sec}[c+d\,x]}}{b^2\,(a^2-b^2)\,d}-\frac{a\,(3\,a^2-4\,b^2)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\Big[\frac{1}{2}\,(c+d\,x),\,2\Big]\,\sqrt{\text{Sec}[c+d\,x]}}{b^3\,(a^2-b^2)\,d}+$$
$$\frac{a^2\,(3\,a^2-5\,b^2)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\Big[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\Big]\,\sqrt{\text{Sec}[c+d\,x]}}{(a-b)\,b^3\,(a+b)^2\,d}-\frac{a^2\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,(a^2-b^2)\,d\,(b+a\,\text{Sec}[c+d\,x])}$$

Result (type 4, 611 leaves):

$$\frac{\sqrt{\text{Sec}[c+d x]}\left(-\frac{a^2 \text{Sin}[c+d x]}{b^2\left(a^2-b^2\right)}-\frac{a^3 \text{Sin}[c+d x]}{b^2\left(-a^2+b^2\right)(a+b \text{Cos}[c+d x])}\right)}{d}+$$
$$\frac{1}{4(a-b) b(a+b) d}\left(-\left(8 a \text{Cos}[c+d x]^2 \text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right](b+a \text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2} \text{Sin}[c+d x]\right)\Big/\right.$$
$$\left((a+b \text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\right)+$$
$$\left(2\left(a^2-2 b^2\right) \text{Cos}[c+d x]^2\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]+\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]\right)\right.$$
$$\left.(b+a \text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2} \text{Sin}[c+d x]\right)\Big/\left(a(a+b \text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\right)+$$
$$\left(\left(3 a^2-2 b^2\right) \text{Cos}[2(c+d x)](b+a \text{Sec}[c+d x])\left(-4 a b+4 a b \text{Sec}[c+d x]^2-4 a b \text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]\right.\right.$$
$$\sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+2(2 a-b) b \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+$$
$$4 a^2 \text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}-$$
$$\left.\left.2 b^2 \text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}\right) \text{Sin}[c+d x]\right)\Big/$$
$$\left.\left(a b^2(a+b \text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]}\left(2-\text{Sec}[c+d x]^2\right)\right)\right)$$

- **Problem 726: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Sec}[c+d x]}}{(a+b \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 4, 321 leaves, 11 steps):

$$-\frac{3 b\left(3 a^2-b^2\right) \sqrt{\text{Cos}[c+d x]} \text{EllipticE}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{4 a^2\left(a^2-b^2\right)^2 d}-\frac{\left(7 a^2-b^2\right) \sqrt{\text{Cos}[c+d x]} \text{EllipticF}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{4 a\left(a^2-b^2\right)^2 d}+$$
$$\frac{3\left(5 a^4-2 a^2 b^2+b^4\right) \sqrt{\text{Cos}[c+d x]} \text{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2}(c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{4 a^2(a-b)^2(a+b)^3 d}+$$
$$\frac{b^2 \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{2 a\left(a^2-b^2\right) d(b+a \text{Sec}[c+d x])^2}+\frac{3 b^2\left(3 a^2-b^2\right) \sqrt{\text{Sec}[c+d x]} \text{Sin}[c+d x]}{4 a^2\left(a^2-b^2\right)^2 d(b+a \text{Sec}[c+d x])}$$

Result (type 4, 700 leaves):

$$\frac{1}{16\,a^2\,(a-b)^2\,(a+b)^2\,d}\Bigg(-\Big(2\,(-32\,a^3\,b+8\,a\,b^3)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/$$
$$\Big(b\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\Big)+$$
$$\Big(2\,(16\,a^4-19\,a^2\,b^2+9\,b^4)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)$$
$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\Big(a\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\Big)+$$
$$\Big((-9\,a^2\,b^2+3\,b^4)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$
$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Big)\Big/$$
$$\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\,\sqrt{\text{Sec}[c+d\,x]}\,(2-\text{Sec}[c+d\,x]^2)\Big)\Bigg)+$$
$$\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{3\,b\,(3\,a^2-b^2)\,\text{Sin}[c+d\,x]}{4\,a^2\,(a^2-b^2)^2}-\frac{b\,\text{Sin}[c+d\,x]}{2\,(a^2-b^2)\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{-7\,a^2\,b\,\text{Sin}[c+d\,x]+b^3\,\text{Sin}[c+d\,x]}{4\,a\,(a^2-b^2)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

- **Problem 727: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^3\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 317 leaves, 11 steps):

$$\frac{(5\,a^2+b^2)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\Big[\frac{1}{2}\,(c+d\,x),\,2\Big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,a\,(a^2-b^2)^2\,d}+\frac{3\,(a^2+b^2)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\Big[\frac{1}{2}\,(c+d\,x),\,2\Big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,b\,(a^2-b^2)^2\,d}-$$
$$\frac{(3\,a^4+10\,a^2\,b^2-b^4)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\Big[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\Big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,a\,(a-b)^2\,b\,(a+b)^3\,d}+$$
$$\frac{b^2\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a\,(a^2-b^2)\,d\,(b+a\,\text{Sec}[c+d\,x])^2}-\frac{b\,(7\,a^2-b^2)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,a\,(a^2-b^2)^2\,d\,(b+a\,\text{Sec}[c+d\,x])}$$

Result (type 4, 680 leaves):

$$\begin{aligned}
&\frac{1}{16\,a\,(a-b)^2\,(a+b)^2\,d}\\
&\Bigg(-\Big(2\,\big(16\,a^3+8\,a\,b^2\big)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\\
&\quad\Big(b\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\Big)+\\
&\quad\Big(2\,\big(-9\,a^2\,b+3\,b^3\big)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)\\
&\qquad(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\,\Big(a\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\Big)+\\
&\quad\Big(\big(5\,a^2\,b+b^3\big)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\\
&\qquad\quad\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+\\
&\qquad\quad 4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-\\
&\qquad\quad 2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Big)\Big/\\
&\qquad\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\,\sqrt{\text{Sec}[c+d\,x]}\,\big(2-\text{Sec}[c+d\,x]^2\big)\Big)\Bigg)+\\
&\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(-\frac{(5\,a^2+b^2)\,\text{Sin}[c+d\,x]}{4\,a\,(a^2-b^2)^2}+\frac{a\,\text{Sin}[c+d\,x]}{2\,(a^2-b^2)\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{3\,(a^2\,\text{Sin}[c+d\,x]+b^2\,\text{Sin}[c+d\,x])}{4\,(a^2-b^2)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}
\end{aligned}$$

- **Problem 728: Result more than twice size of optimal antiderivative.**

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 302 leaves, 11 steps):

$$\begin{aligned}
&-\frac{\big(a^2+5\,b^2\big)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\big[\frac{1}{2}\,(c+d\,x),\,2\big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,b\,\big(a^2-b^2\big)^2\,d}+\frac{a\,\big(a^2-7\,b^2\big)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\big[\frac{1}{2}\,(c+d\,x),\,2\big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,b^2\,\big(a^2-b^2\big)^2\,d}-\\
&\frac{\big(a^4-10\,a^2\,b^2-3\,b^4\big)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\big[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,(a-b)^2\,b^2\,(a+b)^3\,d}-\\
&\frac{b\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,\big(a^2-b^2\big)\,d\,(b+a\,\text{Sec}[c+d\,x])^2}+\frac{3\,\big(a^2+b^2\big)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,\big(a^2-b^2\big)^2\,d\,(b+a\,\text{Sec}[c+d\,x])}
\end{aligned}$$

Result (type 4, 671 leaves):

$$-\frac{1}{16 (a-b)^2 (a+b)^2 d}\left(-\left(48 a \operatorname{Cos}[c+d x]^2 \operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] (b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2}\ \operatorname{Sin}[c+d x]\right) \Big/\right.$$

$$\left((a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Cos}[c+d x]^2\right)\right)+$$

$$\left(2 \left(-5 a^2-b^2\right) \operatorname{Cos}[c+d x]^2 \left(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right]+\operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right]\right)\right.$$

$$\left.(b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2}\ \operatorname{Sin}[c+d x]\right) \Big/ \left(a (a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Cos}[c+d x]^2\right)\right)+$$

$$\left(\left(a^2+5 b^2\right) \operatorname{Cos}[2 (c+d x)] (b+a \operatorname{Sec}[c+d x]) \left(-4 a b+4 a b \operatorname{Sec}[c+d x]^2-4 a b \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right]\right.\right.$$

$$\sqrt{\operatorname{Sec}[c+d x]}\ \sqrt{1-\operatorname{Sec}[c+d x]^2}+2 (2 a-b) b \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] \sqrt{\operatorname{Sec}[c+d x]}\ \sqrt{1-\operatorname{Sec}[c+d x]^2}+$$

$$4 a^2 \operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] \sqrt{\operatorname{Sec}[c+d x]}\ \sqrt{1-\operatorname{Sec}[c+d x]^2}-$$

$$\left.\left.2 b^2 \operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] \sqrt{\operatorname{Sec}[c+d x]}\ \sqrt{1-\operatorname{Sec}[c+d x]^2}\right) \operatorname{Sin}[c+d x]\right) \Big/$$

$$\left.\left(a b^2 (a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Cos}[c+d x]^2\right) \sqrt{\operatorname{Sec}[c+d x]}\ \left(2-\operatorname{Sec}[c+d x]^2\right)\right)\right)+$$

$$\frac{\sqrt{\operatorname{Sec}[c+d x]}\ \left(\frac{\left(a^2+5 b^2\right) \operatorname{Sin}[c+d x]}{4 b \left(-a^2+b^2\right)^2}+\frac{a^2 \operatorname{Sin}[c+d x]}{2 b \left(-a^2+b^2\right) (a+b \operatorname{Cos}[c+d x])^2}+\frac{a^3 \operatorname{Sin}[c+d x]-7 a b^2 \operatorname{Sin}[c+d x]}{4 b \left(-a^2+b^2\right)^2 (a+b \operatorname{Cos}[c+d x])}\right)}{d}$$

## Problem 729: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+b \operatorname{Cos}[c+d x])^3 \operatorname{Sec}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 319 leaves, 11 steps):

$$-\frac{3 a \left(a^2-3 b^2\right) \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{4 b^2 \left(a^2-b^2\right)^2 d}+$$

$$\frac{\left(3 a^4-5 a^2 b^2+8 b^4\right) \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{4 b^3 \left(a^2-b^2\right)^2 d}-$$

$$\frac{3 a \left(a^4-2 a^2 b^2+5 b^4\right) \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{4 (a-b)^2 b^3 (a+b)^3 d}+$$

$$\frac{a \sqrt{\operatorname{Sec}[c+d x]}\ \operatorname{Sin}[c+d x]}{2 \left(a^2-b^2\right) d (b+a \operatorname{Sec}[c+d x])^2}+\frac{a \left(a^2-7 b^2\right) \sqrt{\operatorname{Sec}[c+d x]}\ \operatorname{Sin}[c+d x]}{4 b \left(a^2-b^2\right)^2 d (b+a \operatorname{Sec}[c+d x])}$$

Result (type 4, 694 leaves):

$$-\frac{1}{16\,(a-b)^2\,b\,(a+b)^2\,d}\Bigg(\Big(-\Big(2\,(-8\,a^2\,b-16\,b^3)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/$$
$$\Big(b\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\Big)+$$
$$\Big(2\,(a^3+5\,a\,b^2)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)$$
$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\,\Big(a\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\Big)+$$
$$\Big((3\,a^3-9\,a\,b^2)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$
$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Big)\Big/$$
$$\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\,\sqrt{\text{Sec}[c+d\,x]}\,(2-\text{Sec}[c+d\,x]^2)\Big)\Bigg)+$$
$$\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{3\,a\,(a^2-3\,b^2)\,\text{Sin}[c+d\,x]}{4\,b^2\,(a^2-b^2)^2}-\frac{a^3\,\text{Sin}[c+d\,x]}{2\,b^2\,(-a^2+b^2)\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{-5\,a^4\,\text{Sin}[c+d\,x]+11\,a^2\,b^2\,\text{Sin}[c+d\,x]}{4\,b^2\,(-a^2+b^2)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

- **Problem 730: Unable to integrate problem.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 369 leaves, 6 steps) :

$$\frac{1}{15\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,(9\,a^2-2\,b^2)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$
$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$2\,(a-b)\,\sqrt{a+b}\,(9\,a+2\,b)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$
$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a\,d}+\frac{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 8, 27 leaves) :

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{7/2}\,dx$$

- **Problem 731: Unable to integrate problem.**

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 311 leaves, 5 steps):

$$\frac{1}{3\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,b\,\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]$$
$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$2\,(a-b)\,\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 8, 27 leaves):

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{5/2}\,dx$$

- **Problem 733: Unable to integrate problem.**

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}\ dx$$

Optimal (type 4, 155 leaves, 2 steps):

$$-\frac{1}{\sqrt{a+b}\ d}2\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{\frac{a\,(1-\text{Cos}[c+d\,x])}{a+b\,\text{Cos}[c+d\,x]}}\ \sqrt{\frac{a\,(1+\text{Cos}[c+d\,x])}{a+b\,\text{Cos}[c+d\,x]}}$$
$$(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[\frac{b}{a+b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\Big],\,-\frac{a-b}{a+b}\Big]\sqrt{\text{Sec}[c+d\,x]}$$

Result (type 8, 27 leaves):

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}\ dx$$

- **Problem 735: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 498 leaves, 8 steps):

$$-\frac{1}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,(a+2\,b)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(a^2-4\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1113 leaves):

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{4\,d}+\Bigg(-a^2\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-a\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+2\,a\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^3+a^2\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^5-a\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^5-2\,\mathrm{i}\,a^2\,\text{EllipticPi}\Big[\frac{a+b}{a-b},\mathrm{i}\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]\sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}(c+d\,x)\big]^2}{a+b}}+8\,\mathrm{i}\,b^2\,\text{EllipticPi}\Big[\frac{a+b}{a-b},\mathrm{i}\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]\sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}(c+d\,x)\big]^2}{a+b}}-2\,\mathrm{i}\,a^2\,\text{EllipticPi}\Big[\frac{a+b}{a-b},\mathrm{i}\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+8\,i\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\,-$$

$$i\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+2\,i\,\left(a^2+a\,b-2\,b^2\right)\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\Bigg/$$

$$\left(4\,b\,\sqrt{\frac{a-b}{a+b}}\,d\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)$$

- **Problem 736: Unable to integrate problem.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 427 leaves, 7 steps) :

$$\frac{1}{105\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}4\,(a-b)\,b\,\sqrt{a+b}\,\left(41\,a^2-3\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(25\,a^2-57\,a\,b-6\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\left(25\,a^2+3\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,a\,d}+$$

$$\frac{16\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,d}+\frac{2\,a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 8, 27 leaves) :

$$\int(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

- **Problem 737: Unable to integrate problem.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 365 leaves, 6 steps) :

$$\frac{1}{5\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(3\,a^2+b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{5\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,(3\,a-b)\,\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{4\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 8, 27 leaves) :

$$\int(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

## Problem 738: Unable to integrate problem.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 317 leaves, 5 steps) :

$$\frac{1}{3\,a\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$
$$8\,(a-b)\,b\,\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{3\,a\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-3\,b)\,(a-b)\,\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 8, 27 leaves) :

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{5/2}\,dx$$

## Problem 743: Attempted integration timed out after 120 seconds.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 494 leaves, 8 steps) :

$$\frac{1}{315\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(147\,a^4+279\,a^2\,b^2-10\,b^4\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{315\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(147\,a^3-114\,a^2\,b+165\,a\,b^2+10\,b^3\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,b\,\left(163\,a^2+5\,b^2\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,a\,d}+\frac{2\,\left(49\,a^2+75\,b^2\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{315\,d}+$$

$$\frac{38\,a\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,d}+\frac{2\,a^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves) :

???

## Problem 744: Unable to integrate problem.

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 427 leaves, 7 steps) :

$$\frac{1}{21\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,b\,\sqrt{a+b}\,\left(29\,a^2+3\,b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{21\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(5\,a^2-24\,a\,b+3\,b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,\left(5\,a^2+9\,b^2\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{21\,d}+$$

$$\frac{6\,a\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,a^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 8, 27 leaves) :

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

- **Problem 745: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 378 leaves, 6 steps):

$$\frac{1}{15\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2+23\,b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2-8\,a\,b+15\,b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}$$
$$\text{Csc}[c+d\,x]\,\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{22\,a\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,a^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 748: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}\,\,dx$$

Optimal (type 4, 503 leaves, 8 steps):

$$-\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}9\,(a-b)\,b\,\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(8\,a^2+9\,a\,b+2\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(15\,a^2+4\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{b^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{9\,a\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 4, 3693 leaves) :

$$\frac{b^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{4\,d}+$$

$$\left(\left(\frac{3\,a^2\,b}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{b^3}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a^3\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.\right.$$

$$\left.\frac{11\,a\,b^2\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{9\,a\,b^2\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right)$$

$$\left(-18\,a\,b\,(a+b)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-\right.$$

$$4\,\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$4\,b\,\left(15\,a^2+4\,b^2\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$9\,a\,b\,\mathrm{Cos}[c+d\,x]\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)\Bigg)\Bigg/$$

$$\left(4\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right.$$

$$\left(-\left(\left(\sqrt{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-18\,a\,b\,(a+b)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\right.\right.\right.\right.$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-4\,\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+4\,b\,\left(15\,a^2+4\,b^2\right)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\Big[$$

$$-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\Big]-9\,a\,b\,\mathrm{Cos}[c+d\,x]\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)\Bigg)\Bigg/$$

$$\left.\left(4\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\right)\right)+$$

$$\left(b\,\mathrm{Sin}[c+d\,x]\,\left(-18\,a\,b\,(a+b)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-\right.\right.$$

$$4\,\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$4\,b\,\left(15\,a^2+4\,b^2\right)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$9\,a\,b\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)\Bigg)\Bigg/$$

$$\left(8\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\sqrt{\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)-$$

$$\Bigg(\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg(-18\,a\,b\,(a+b)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$4\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$4\,b\left(15\,a^2+4\,b^2\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$9\,a\,b\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)\Bigg)\Bigg/$$

$$\left(8\sqrt{a+b\,\text{Cos}[c+d\,x]}\sqrt{\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\Bigg(-\frac{9}{2}\,a\,b\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^4-\frac{1}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}$$

$$9\,a\,b\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)-$$

$$\frac{1}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}2\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)+\frac{1}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}2\,b\,\left(15\,a^2+4\,b^2\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)-$$

$$\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}9\,a\,b\,(a+b)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}2\,\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)$$

$$\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}2\,b\,\left(15\,a^2+4\,b^2\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+9\,a\,b^2\,\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sin}[c+d\,x]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$9\,a\,b\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sin}[c+d\,x]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-9\,a\,b\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-\frac{2\,\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-$$

$$\frac{2\,b\,\left(15\,a^2+4\,b^2\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-$$

$$\left.\frac{9\,a\,b\,(a+b)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\Bigg/$$

$$\left(4\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\;\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)-$$

$$\left(\left(-18\,a\,b\,(a+b)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-\right.\right.$$

$$4\left(4\,a^3-12\,a^2\,b+a\,b^2-2\,b^3\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$4\,b\left(15\,a^2+4\,b^2\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$\left.9\,a\,b\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\left.\left(-\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)\right)\Bigg/$$

$$\left.\left(8\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\;\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sec}[c+d\,x]\right)^{3/2}\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 750: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 638 leaves, 10 steps) :

$$-\frac{1}{192\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(15\,a^2+284\,b^2\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{192\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\left(15\,a^3+118\,a^2\,b+284\,a\,b^2+72\,b^3\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{64\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(5\,a^4-120\,a^2\,b^2-48\,b^4\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{b^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{17\,a\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{24\,d\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{\left(59\,a^2+36\,b^2\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{96\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+$$

$$\frac{a\,\left(15\,a^2+284\,b^2\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{192\,b\,d}$$

Result (type 4, 1642 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(\frac{17}{96}\,a\,b\,\mathrm{Sin}[c+d\,x]+\frac{1}{192}\left(59\,a^2+48\,b^2\right)\mathrm{Sin}[2\,(c+d\,x)]+\frac{17}{96}\,a\,b\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{32}\,b^2\,\mathrm{Sin}[4\,(c+d\,x)]\right)+$$

$$\left(-15\,a^4\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-15\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-284\,a^2\,b^2\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-\right.$$

$$284\,a\,b^3\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+30\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+568\,a\,b^3\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+$$

$$15\,a^4\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-15\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+284\,a^2\,b^2\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-$$

$$284\,a\,b^3\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-30\,i\,a^4\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+720\,i\,a^2\,b^2\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$288\,i\,b^4\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-30\,i\,a^4\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$720\,i\,a^2\,b^2\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+288\,i\,b^4\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$i\,a\,\left(15\,a^3-15\,a^2\,b+284\,a\,b^2-284\,b^3\right)\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$2\,i\,\left(15\,a^4+59\,a^3\,b-38\,a^2\,b^2+36\,a\,b^3-72\,b^4\right)\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\Bigg)\Bigg/$$

$$\left(192\,b\sqrt{\frac{a-b}{a+b}}\,d\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)$$

- **Problem 751: Unable to integrate problem.**

$$\int\frac{\text{Sec}[c+d x]^{5/2}}{\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 314 leaves, 5 steps):

$$-\frac{1}{3\,a^3\,d\sqrt{\text{Sec}[c+d x]}}4\,(a-b)\,b\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{3\,a^2\,d\sqrt{\text{Sec}[c+d x]}}$$

$$2\sqrt{a+b}\,(a+2\,b)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{2\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3\,a\,d}$$

Result (type 8, 27 leaves):

$$\int\frac{\text{Sec}[c+d x]^{5/2}}{\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

- **Problem 752: Unable to integrate problem.**

$$\int\frac{\text{Sec}[c+d x]^{3/2}}{\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 264 leaves, 4 steps):

$$\frac{1}{a^2 d \sqrt{\text{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \sqrt{\text{Cos}[c+d x]} \text{Csc}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{a d \sqrt{\text{Sec}[c+d x]}}$$

$$2 \sqrt{a+b} \sqrt{\text{Cos}[c+d x]} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}$$

Result (type 8, 27 leaves) :

$$\int \frac{\text{Sec}[c+d x]^{3/2}}{\sqrt{a+b\,\text{Cos}[c+d x]}} \, dx$$

- **Problem 754: Unable to integrate problem.**

$$\int \frac{1}{\sqrt{a+b\,\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}} \, dx$$

Optimal (type 4, 136 leaves, 2 steps) :

$$-\frac{1}{b d \sqrt{\text{Sec}[c+d x]}}$$

$$2 \sqrt{a+b} \sqrt{\text{Cos}[c+d x]} \text{Csc}[c+d x] \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}$$

Result (type 8, 27 leaves) :

$$\int \frac{1}{\sqrt{a+b\,\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}} \, dx$$

- **Problem 755: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{\sqrt{a+b\,\text{Cos}[c+d x]} \, \text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 474 leaves, 9 steps) :

$$-\frac{1}{a\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$\left((a-b)\,\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\right)+$$

$$\frac{1}{b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$a\,\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{a\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 759 leaves) :

$$\frac{1}{b\sqrt{\frac{a-b}{a+b}}\,d\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\left(a\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}+b\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}+\right.$$

$$a\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}-b\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}+$$

$$2\,i\,a\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$2\,i\,a\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$i\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$\left.2\,i\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 756: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 505 leaves, 8 steps) :

$$\frac{1}{4 b^2 d \sqrt{\text{Sec}[c+d x]}} 3 (a-b) \sqrt{a+b} \sqrt{\text{Cos}[c+d x]} \,\text{Csc}[c+d x]$$

$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\Big], -\frac{a+b}{a-b}\Big] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{4 b^2 d \sqrt{\text{Sec}[c+d x]}}$$

$$(3 a-2 b) \sqrt{a+b} \sqrt{\text{Cos}[c+d x]} \,\text{Csc}[c+d x] \,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\Big], -\frac{a+b}{a-b}\Big] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{1}{4 b^3 d \sqrt{\text{Sec}[c+d x]}} \sqrt{a+b} \left(3 a^2+4 b^2\right) \sqrt{\text{Cos}[c+d x]} \,\text{Csc}[c+d x] \,\text{EllipticPi}\Big[\frac{a+b}{b}, \text{ArcSin}\Big[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\Big], -\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{\sqrt{a+b \,\text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{2 b d \sqrt{\text{Sec}[c+d x]}} - \frac{3 a \sqrt{a+b \,\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]} \,\text{Sin}[c+d x]}{4 b^2 d}$$

Result (type 4, 1153 leaves) :

$$\frac{\sqrt{a+b \,\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]} \,\text{Sin}[2 (c+d x)]}{4 b d} -$$

$$\left(\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}} \right. \left(3 a^2 \sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big] + 3 a b \sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big] -\right.$$

$$6 a b \sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^3 - 3 a^2 \sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^5 + 3 a b \sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^5 + 6 i a^2 \,\text{EllipticPi}\Big[\frac{a+b}{a-b},$$

$$i \,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]\Big], -\frac{a+b}{a-b}\Big] \sqrt{1-\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}} +$$

$$8 i b^2 \,\text{EllipticPi}\Big[\frac{a+b}{a-b}, i \,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]\Big], -\frac{a+b}{a-b}\Big] \sqrt{1-\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2}$$

$$\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}} + 6 i a^2 \,\text{EllipticPi}\Big[\frac{a+b}{a-b}, i \,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}} \,\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]\Big], -\frac{a+b}{a-b}\Big]$$

$$\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2 \sqrt{1-\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}} +$$

$$8\,\mathrm{i}\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+3\,\mathrm{i}\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$2\,\mathrm{i}\left(3\,a^2-a\,b+2\,b^2\right)\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\left.\left.\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\right)\Bigg/$$

$$\left(4\,b^2\sqrt{\frac{a-b}{a+b}}\,d\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(b\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-a\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 757: Unable to integrate problem.**

$$\int\frac{\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 397 leaves, 6 steps) :

$$-\left(2\,b\,\left(5\,a^2-8\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^4\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\left(2\,(a+2\,b)\,(a+4\,b)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^3\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\frac{2\,b^2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,\left(a^2-4\,b^2\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)d}$$

Result (type 8, 27 leaves):

$$\int\frac{\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

- **Problem 758: Unable to integrate problem.**

$$\int\frac{\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 325 leaves, 5 steps):

$$\left(2\,\left(a^2-2\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a^3\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)-$$

$$\left(2\,(a+2\,b)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a^2\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+\frac{2\,b^2\,\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 27 leaves):

$$\int \frac{\text{Sec}[c+d x]^{3/2}}{(a+b\,\text{Cos}[c+d x])^{3/2}}\,dx$$

- **Problem 759: Unable to integrate problem.**

$$\int \frac{\sqrt{\text{Sec}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 307 leaves, 5 steps):

$$\left(2\,b\,\sqrt{\text{Cos}[c+d x]}\;\text{Csc}[c+d x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/$$
$$\left(a^2\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d x]}\right)+\frac{1}{a\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d x]}}2\,\sqrt{\text{Cos}[c+d x]}\;\text{Csc}[c+d x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{2\,b\,\sqrt{\text{Sec}[c+d x]}\;\text{Sin}[c+d x]}{\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 8, 27 leaves):

$$\int \frac{\sqrt{\text{Sec}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^{3/2}}\,dx$$

- **Problem 761: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{1}{(a+b\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{3/2}}\,dx$$

Optimal (type 4, 447 leaves, 7 steps):

$$\frac{1}{b\sqrt{a+b}\ d\sqrt{\text{Sec}[c+d\,x]}}2\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b\sqrt{a+b}\ d\sqrt{\text{Sec}[c+d\,x]}}$$

$$2\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{b^2\,d\sqrt{\text{Sec}[c+d\,x]}}2\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]\ \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{2\,a^2\sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1175 leaves):

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}\ \left(\frac{2\,a\,\text{Sin}[c+d\,x]}{b\,(a^2-b^2)}+\frac{2\,a^2\,\text{Sin}[c+d\,x]}{b\,(-a^2+b^2)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}-$$

$$\left(2\left(-a^2\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-a\,b\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+2\,a\,b\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+a^2\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-\right.\right.$$

$$a\,b\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-2\,i\,a^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+2\,i\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\ \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$2\,i\,a^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+2\,i\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\tan\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\tan\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \tan\left[\frac{1}{2}(c+d x)\right]^2-b \tan\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} -$$

$$i a (a-b) \text{EllipticE}\left[i \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}} \tan\left[\frac{1}{2}(c+d x)\right]\right], -\frac{a+b}{a-b}\right] \sqrt{1-\tan\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\tan\left[\frac{1}{2}(c+d x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a \tan\left[\frac{1}{2}(c+d x)\right]^2-b \tan\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} + i \left(2 a^2-a b-b^2\right) \text{EllipticF}\left[i \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}} \tan\left[\frac{1}{2}(c+d x)\right]\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\tan\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\tan\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a \tan\left[\frac{1}{2}(c+d x)\right]^2-b \tan\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\Bigg)\Bigg) \Bigg/$$

$$\left(b \sqrt{\frac{a-b}{a+b}} \left(a^2-b^2\right) d \sqrt{\frac{1}{1-\tan\left[\frac{1}{2}(c+d x)\right]^2}} \left(-1+\tan\left[\frac{1}{2}(c+d x)\right]^2\right) \left(1+\tan\left[\frac{1}{2}(c+d x)\right]^2\right)^{3/2}\right.$$

$$\left.\sqrt{\frac{a+b+a \tan\left[\frac{1}{2}(c+d x)\right]^2-b \tan\left[\frac{1}{2}(c+d x)\right]^2}{1+\tan\left[\frac{1}{2}(c+d x)\right]^2}}\right)$$

- **Problem 763: Unable to integrate problem.**

$$\int \frac{\text{Sec}[c+d x]^{5/2}}{(a+b \cos[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 513 leaves, 7 steps) :

$$-\left(8\,b\,\left(2\,a^4-7\,a^2\,b^2+4\,b^4\right)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^5\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}\right)+$$

$$\left(2\,\left(a^4+9\,a^3\,b+16\,a^2\,b^2-12\,a\,b^3-16\,b^4\right)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^4\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}\right)+$$

$$\frac{2\,b^2\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{4\,b^2\,\left(5\,a^2-3\,b^2\right)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,\left(a^4-13\,a^2\,b^2+8\,b^4\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a^3\,\left(a^2-b^2\right)^2\,d}$$

Result (type 8, 27 leaves):

$$\int\frac{\mathrm{Sec}[c+d\,x]^{5/2}}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

- **Problem 764: Unable to integrate problem.**

$$\int\frac{\mathrm{Sec}[c+d\,x]^{3/2}}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 438 leaves, 6 steps):

$$\left(2\left(3a^4-15a^2b^2+8b^4\right)\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{Csc}[c+dx]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}\right)\Bigg/\left(3a^4\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+dx]}\right)-$$

$$\left(2\left(3a^3+9a^2b-6ab^2-8b^3\right)\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{Csc}[c+dx]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}\right)\Bigg/\left(3a^3\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+dx]}\right)+$$

$$\frac{2b^2\sqrt{\mathrm{Sec}[c+dx]}\,\mathrm{Sin}[c+dx]}{3a\left(a^2-b^2\right)d\,(a+b\,\mathrm{Cos}[c+dx])^{3/2}}+\frac{8b^2\left(2a^2-b^2\right)\sqrt{\mathrm{Sec}[c+dx]}\,\mathrm{Sin}[c+dx]}{3a^2\left(a^2-b^2\right)^2 d\,\sqrt{a+b\,\mathrm{Cos}[c+dx]}}$$

Result (type 8, 27 leaves) :

$$\int\frac{\mathrm{Sec}[c+dx]^{3/2}}{(a+b\,\mathrm{Cos}[c+dx])^{5/2}}\,dx$$

## Problem 765: Unable to integrate problem.

$$\int\frac{\sqrt{\mathrm{Sec}[c+dx]}}{(a+b\,\mathrm{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 4, 421 leaves, 6 steps) :

$$\left(4b\left(3a^2-b^2\right)\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{Csc}[c+dx]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}\right)\Bigg/$$

$$\left(3a^3\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+dx]}\right)+\left(2\left(3a^2-3ab-2b^2\right)\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{Csc}[c+dx]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}\right)\Bigg/\left(3a^2\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+dx]}\right)+$$

$$\frac{2b^2\,\mathrm{Sin}[c+dx]}{3a\left(a^2-b^2\right)d\,(a+b\,\mathrm{Cos}[c+dx])^{3/2}\sqrt{\mathrm{Sec}[c+dx]}}-\frac{4b\left(3a^2-b^2\right)\sqrt{\mathrm{Sec}[c+dx]}\,\mathrm{Sin}[c+dx]}{3a\left(a^2-b^2\right)^2 d\,\sqrt{a+b\,\mathrm{Cos}[c+dx]}}$$

Result (type 8, 27 leaves):

$$\int \frac{\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

- **Problem 766: Unable to integrate problem.**

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 399 leaves, 6 steps):

$$-\left(2\,\left(3\,a^2+b^2\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(3\,a^2\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\left(2\,(3\,a-b)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(3\,a\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-\frac{2\,b\,\text{Sin}[c+d\,x]}{3\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,\left(3\,a^2+b^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{3\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 27 leaves):

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

- **Problem 767: Unable to integrate problem.**

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 382 leaves, 6 steps):

$$\left(8\,b\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(3\,a\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\left(2\,(a-3\,b)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(3\,a\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+\frac{2\,a\,\text{Sin}[c+d\,x]}{3\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{8\,a\,b\,\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 27 leaves) :

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

## Problem 768: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 557 leaves, 8 steps) :

$$\left(2\,\left(3\,a^2-7\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(3\,(a-b)\,b^2\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-$$
$$\left(2\,\left(3\,a^2+a\,b-6\,b^2\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\right.$$
$$\left.\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,(a-b)\,b^2\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-\frac{1}{b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$2\,\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{2\,a^2\,\text{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{2\,a^2\,\left(3\,a^2-7\,b^2\right)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1716 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\left(\frac{2\,a\,\left(3\,a^2-7\,b^2\right)\,\text{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)^2}-\frac{2\,a^3\,\text{Sin}[c+d\,x]}{3\,b^2\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{8\,\left(a^4\,\text{Sin}[c+d\,x]-2\,a^2\,b^2\,\text{Sin}[c+d\,x]\right)}{3\,b^2\,\left(-a^2+b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)+$$

$$\Bigg(2\,\Bigg(3\,a^4\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-7\,a^2\,b^2\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-$$

$$7\,a\,b^3\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-6\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+14\,a\,b^3\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-$$

$$3\,a^4\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+7\,a^2\,b^2\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$7\,a\,b^3\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+6\,i\,a^4\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-12\,i\,a^2\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$6\,i\,b^4\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,i\,a^4\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$12\,i\,a^2\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,i\,b^4\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$i\,a\left(3a^3-3a^2b-7ab^2+7b^3\right)\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$i\left(6a^4-2a^3b-13a^2b^2+6ab^3+3b^4\right)\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\left.\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(3b^2\sqrt{\frac{a-b}{a+b}}\left(a^2-b^2\right)^2 d\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right)$$

- **Problem 773: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^m}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 6, 190 leaves, 5 steps):

$$\frac{a\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1-m}{2},1,\frac{3}{2},\mathrm{Sin}[c+d\,x]^2,-\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{a^2-b^2}\right]\mathrm{Cos}[c+d\,x]^{-1+m}\left(\mathrm{Cos}[c+d\,x]^2\right)^{\frac{1-m}{2}}\mathrm{Sin}[c+d\,x]}{\left(a^2-b^2\right)d}-$$

$$\frac{b\,\mathrm{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},\mathrm{Sin}[c+d\,x]^2,-\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{a^2-b^2}\right]\mathrm{Cos}[c+d\,x]^{m}\left(\mathrm{Cos}[c+d\,x]^2\right)^{-m/2}\mathrm{Sin}[c+d\,x]}{\left(a^2-b^2\right)d}$$

Result (type 6, 6355 leaves):

$$\left(3\left(a^2-b^2\right)\mathrm{Cos}[c+d\,x]^{-1+m}\,\mathrm{Sin}[c+d\,x]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right.$$

$$\left.\left(b+a\sqrt{1+\mathrm{Tan}[c+d\,x]^2}\right)\left(-\left(a\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\mathrm{Tan}[c+d\,x]^2}\right)\right.\right)\Big/$$

$$\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)+$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\right)\right)\Big/$$

$$\left(d\,(a+b\,\text{Cos}[c+d\,x])\left(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right.$$

$$\left(-\frac{1}{\left(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2}6\,a^2\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right.$$

$$\left(b+a\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\left(-\left(a\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\sqrt{1+\text{Tan}[c+d\,x]^2}\right)\Big/\right.$$

$$\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)+$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\Big/\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},\right.\right.$$

$$\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\right)+$$

$$\frac{1}{\left(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}3\,a\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{3}{2}-\frac{m}{2}}$$

$$\Bigg(-\Bigg(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\Bigg)\Big/$$

$$\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)+$$

$$\Bigg(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\Big/\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},$$

$$-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\Bigg)+$$

$$\frac{1}{\Big(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\Big)^2\,\big(-b^2+a^2\,(1+\text{Tan}[c+d\,x]^2)\big)}\,3\,b\,(a^2-b^2)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,(1+\text{Tan}[c+d\,x]^2)^{-\frac{5}{2}-\frac{m}{2}}$$

$$\Big(b+a\sqrt{1+\text{Tan}[c+d\,x]^2}\Big)\,\Bigg(-\Bigg(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\Bigg)\Big/$$

$$\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)+$$

$$\Bigg(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\Big/\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},$$

$$-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\Bigg)+$$

$$\frac{1}{\Big(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\Big)\,\big(-b^2+a^2\,(1+\text{Tan}[c+d\,x]^2)\big)}\,6\,(a^2-b^2)\,\Big(-1-\frac{m}{2}\Big)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,(1+\text{Tan}[c+d\,x]^2)^{-2-\frac{m}{2}}$$

$$\Big(b+a\sqrt{1+\text{Tan}[c+d\,x]^2}\Big)\,\Bigg(-\Bigg(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\Bigg)\Big/$$

$$\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\text{Tan}[c+d\,x]^2\Bigg)+$$

$$\Big(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\Big/\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},$$

$$-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\text{Tan}[c+d\,x]^2\Bigg)\Bigg)+$$

$$\frac{1}{\left(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}3\left(a^2-b^2\right)\text{Sec}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\left(b+a\sqrt{1+\text{Tan}[c+d\,x]^2}\right)$$

$$\Bigg(-\Big(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\sqrt{1+\text{Tan}[c+d\,x]^2}\Big)\Big/$$

$$\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\text{Tan}[c+d\,x]^2\Bigg)+$$

$$\Big(b\,\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\Big/\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},$$

$$-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\text{Tan}[c+d\,x]^2\Bigg)\Bigg)+$$

$$\frac{1}{\left(a+\frac{b}{\sqrt{1+\text{Tan}[c+d\,x]^2}}\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)}3\left(a^2-b^2\right)\text{Tan}[c+d\,x]\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\left(b+a\sqrt{1+\text{Tan}[c+d\,x]^2}\right)$$

$$\Bigg(-\Big(a\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Big)\Big/\Bigg(\sqrt{1+\text{Tan}[c+d\,x]^2}$$

$$\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(a^2-b^2\right) m \,\text{AppellF1}\Big[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \text{Tan}[c+d x]^2\Big)\Big) -$$

$$\Big(a \Big(-\frac{1}{3} m \,\text{AppellF1}\Big[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\frac{2 a^2 \text{AppellF1}\Big[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 \left(a^2-b^2\right)}\Big) \sqrt{1+\text{Tan}[c+d x]^2}\Big) \Big/$$

$$\Big(-3 \left(a^2-b^2\right) \text{AppellF1}\Big[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] + \Big(2 a^2 \text{AppellF1}\Big[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2,$$

$$-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(a^2-b^2\right) m \,\text{AppellF1}\Big[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \text{Tan}[c+d x]^2\Big) +$$

$$\Big(b \Big(-\frac{2 a^2 \text{AppellF1}\Big[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 \left(a^2-b^2\right)} - \frac{1}{3} (1+m) \,\text{AppellF1}\Big[$$

$$\frac{3}{2}, 1+\frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\Big)\Big) \Big/$$

$$\Big(-3 \left(a^2-b^2\right) \text{AppellF1}\Big[\frac{1}{2}, \frac{1+m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] + \Big(2 a^2 \text{AppellF1}\Big[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2,$$

$$-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(a^2-b^2\right) (1+m) \,\text{AppellF1}\Big[\frac{3}{2}, \frac{3+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \text{Tan}[c+d x]^2\Big) +$$

$$\Big(a \,\text{AppellF1}\Big[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \sqrt{1+\text{Tan}[c+d x]^2} \;\Big(2 \Big(2 a^2 \text{AppellF1}\Big[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2,$$

$$-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(a^2-b^2\right) m \,\text{AppellF1}\Big[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big) \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$3 \left(a^2-b^2\right) \Big(-\frac{1}{3} m \,\text{AppellF1}\Big[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\frac{2 a^2 \text{AppellF1}\Big[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 \left(a^2-b^2\right)}\Big) +$$

$$\text{Tan}[c+d x]^2 \Big(2 a^2 \Big(-\frac{3}{5} m \,\text{AppellF1}\Big[\frac{5}{2}, 1+\frac{m}{2}, 2, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\Big] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)+$$

$$\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2-$$

$$\left(b\,\text{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[$$

$$c+d\,x]-3\left(a^2-b^2\right)\left(-\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right)(1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{3+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{3}{5}(3+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{3+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big] + \left(a^2-b^2\right)(1+m)\operatorname{AppellF1}\Big[\frac{3}{2},\frac{3+m}{2},1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big)\operatorname{Tan}[c+d x]^2\Big)^2\Big)\Big)\Big)$$

## Problem 774: Result more than twice size of optimal antiderivative.

$$\int \frac{\operatorname{Cos}[c+d x]^m}{(a+b \operatorname{Cos}[c+d x])^2}\, dx$$

Optimal (type 6, 294 leaves, 8 steps):

$$\frac{1}{\left(a^2-b^2\right)^2 d} b^2 \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}(-1-m),2,\frac{3}{2},\operatorname{Sin}[c+d x]^2,-\frac{b^2 \operatorname{Sin}[c+d x]^2}{a^2-b^2}\Big]\operatorname{Cos}[c+d x]^{1+m}\left(\operatorname{Cos}[c+d x]^2\right)^{\frac{1}{2}(-1-m)}\operatorname{Sin}[c+d x]+$$

$$\frac{a^2 \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1-m}{2},2,\frac{3}{2},\operatorname{Sin}[c+d x]^2,-\frac{b^2 \operatorname{Sin}[c+d x]^2}{a^2-b^2}\Big]\operatorname{Cos}[c+d x]^{-1+m}\left(\operatorname{Cos}[c+d x]^2\right)^{\frac{1-m}{2}}\operatorname{Sin}[c+d x]}{\left(a^2-b^2\right)^2 d}-$$

$$\frac{2 a b \operatorname{AppellF1}\Big[\frac{1}{2},-\frac{m}{2},2,\frac{3}{2},\operatorname{Sin}[c+d x]^2,-\frac{b^2 \operatorname{Sin}[c+d x]^2}{a^2-b^2}\Big]\operatorname{Cos}[c+d x]^{m}\left(\operatorname{Cos}[c+d x]^2\right)^{-m/2}\operatorname{Sin}[c+d x]}{\left(a^2-b^2\right)^2 d}$$

Result (type 6, 7214 leaves):

$$\Big(3\left(a^2-b^2\right)\operatorname{Cos}[c+d x]^{-1+m}\operatorname{Sin}[c+d x]\left(1+\operatorname{Tan}[c+d x]^2\right)^{-m/2}$$

$$\Big(-\operatorname{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big/\Big(\Big(-3\left(a^2-b^2\right)\operatorname{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+$$

$$\Big(\left(a^2-b^2\right) m \operatorname{AppellF1}\Big[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+$$

$$2 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]\Big)\operatorname{Tan}[c+d x]^2\Big)\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d x]^2\right)\right)\Big)+$$

$$\frac{1}{\left(b^2-a^2\left(1+\operatorname{Tan}[c+d x]^2\right)\right)^2} 2 b\Big(\Big(a \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,\frac{a^2 \operatorname{Tan}[c+d x]^2}{-a^2+b^2}\Big]\sqrt{1+\operatorname{Tan}[c+d x]^2}\Big)\Big/$$

$$\Big(-3\left(a^2-b^2\right)\operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+$$

$$\Big(4 a^2 \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\operatorname{Tan}[c+d x]^2,-\frac{a^2 \operatorname{Tan}[c+d x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)(-1+m)\operatorname{AppellF1}\Big[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},$$

$$-\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\ \mathrm{Tan}[c+d\,x]^2\Big)-\Big(b\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ \frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\Big/$$

$$\Big(-3\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(4\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 3,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{2+m}{2},\ 2,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\ \mathrm{Tan}[c+d\,x]^2\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big(d\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,\Big(-3\,(a^2-b^2)\,m\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]^2\,(1+\mathrm{Tan}[c+d\,x]^2)^{-1-\frac{m}{2}}$$

$$\Big(-\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big/\Big(\Big(-3\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Big((a^2-b^2)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\ 1+\frac{m}{2},\ 1,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\ \mathrm{Tan}[c+d\,x]^2\Big)\ \big(-b^2+a^2\,(1+\mathrm{Tan}[c+d\,x]^2)\big)\Big)+$$

$$\frac{1}{\big(b^2-a^2\,(1+\mathrm{Tan}[c+d\,x]^2)\big)^2}\,2\,b\,\Big(\Big(a\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}\,(-1+m),\ 2,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ \frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\ \sqrt{1+\mathrm{Tan}[c+d\,x]^2}\Big)\Big/$$

$$\Big(-3\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}\,(-1+m),\ 2,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Big(4\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}\,(-1+m),\ 3,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,(-1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{1+m}{2},\ 2,\ \frac{5}{2},$$

$$-\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\ \mathrm{Tan}[c+d\,x]^2\Big)-\Big(b\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ \frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\Big/$$

$$\Big(-3\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(4\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 3,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+(a^2-b^2)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\ \frac{2+m}{2},\ 2,\ \frac{5}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\ \mathrm{Tan}[c+d\,x]^2\Big)\Big)\Big)+$$

$$3\,(a^2-b^2)\,\mathrm{Sec}[c+d\,x]^2\,(1+\mathrm{Tan}[c+d\,x]^2)^{-m/2}\,\Big(-\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big/$$

$$\Big(\Big(-3\,(a^2-b^2)\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\mathrm{Tan}[c+d\,x]^2,\ -\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.2 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\Bigg)+$$

$$\frac{1}{\left(b^2-a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^2} 2 b \left(\left(a \,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \,\text{Tan}[c+d x]^2}{-a^2+b^2}\right] \sqrt{1+\text{Tan}[c+d x]^2}\right)\Big/\right.$$

$$\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$

$$\left(4 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right) (-1+m) \,\text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2},\right.\right.$$

$$\left.\left.\left.-\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right)-\left(b \,\text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\right)\Big/$$

$$\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(4 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 3, \frac{5}{2}, -\text{Tan}[c+d x]^2,\right.\right.\right.$$

$$\left.\left.\left.\left.-\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right)\right)\right)+$$

$$3 \left(a^2-b^2\right) \text{Tan}[c+d x] \left(1+\text{Tan}[c+d x]^2\right)^{-m/2} \left(\left(2 a^2 \,\text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \,\text{Tan}[c+d x]\right)\Big/\right.$$

$$\left(\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.2 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)-$$

$$\left(-\frac{1}{3} m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \,\text{Tan}[c+d x]-\right.$$

$$\left.\frac{2 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \,\text{Tan}[c+d x]}{3 \left(a^2-b^2\right)}\right)\Big/$$

$$\left(\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2},\right.\right.\right.\right.$$

$$-\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)$$

$$\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Big)+\frac{1}{\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^3}\,8\,a^2\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]$$

$$\Bigg(\Bigg(\text{a AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}\,(-1+m),\ 2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\sqrt{1+\text{Tan}[c+d\,x]^2}\Bigg)\Big/\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}\,(-1+m),$$

$$2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}\,(-1+m),\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1+m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)-$$

$$\Big(\text{b AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\Big/\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,m\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{2+m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\Bigg)+$$

$$\Bigg(\text{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\Bigg(2\,\Big(\left(a^2-b^2\right)\,m\,\text{AppellF1}\Big[\frac{3}{2},\ 1+\frac{m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\,\left(a^2-b^2\right)\,\Bigg(-\frac{1}{3}\,m\,\text{AppellF1}\Big[\frac{3}{2},\ 1+\frac{m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,\left(a^2-b^2\right)}\Bigg)+\text{Tan}[c+d\,x]^2$$

$$\Bigg(\left(a^2-b^2\right)\,m\,\Bigg(-\frac{1}{5\,\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\Big[\frac{5}{2},\ 1+\frac{m}{2},\ 2,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{6}{5}\,\left(1+\frac{m}{2}\right)\,\text{AppellF1}\Big[\frac{5}{2},\ 2+\frac{m}{2},\ 1,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)+$$

$$2\,a^2\,\Bigg(-\frac{3}{5}\,m\,\text{AppellF1}\Big[\frac{5}{2},\ 1+\frac{m}{2},\ 2,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{1}{5\,\left(a^2-b^2\right)}$$

$$12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},\right.$$

$$\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)^2$$

$$\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)+\frac{1}{\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2}\,2\,b\,\Bigg(\Bigg(a\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$\left.\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)\Bigg/\Bigg(\sqrt{1+\text{Tan}[c+d\,x]^2}\,\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},\right.$$

$$\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)\Bigg)+$$

$$\Bigg(a\,\Bigg(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+1\Big/\left(3\left(-a^2+b^2\right)\right)$$

$$4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)\sqrt{1+\text{Tan}[c+d\,x]^2}\Bigg)\Bigg/$$

$$\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\right.$$

$$\left.\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)$$

$$\text{Tan}[c+d\,x]^2\Bigg)-\Bigg(b\,\Bigg(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\frac{4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(-a^2+b^2\right)}\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)-$$

$$\Bigg(a\,\text{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}\,(-1+m),\ 2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\ \sqrt{1+\text{Tan}[c+d\,x]^2}$$

$$\Bigg(2\,\Bigg(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}\,(-1+m),\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\,(-1+m)$$

$$\text{AppellF1}\Big[\frac{3}{2},\ \frac{1+m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-3\,\left(a^2-b^2\right)$$

$$\Bigg(-\frac{1}{3}\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\ 1+\frac{1}{2}\,(-1+m),\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{1}{3\,\left(a^2-b^2\right)}$$

$$4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}\,(-1+m),\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)+\text{Tan}[c+d\,x]^2$$

$$\Bigg(4\,a^2\,\Bigg(-\frac{3}{5}\,(-1+m)\,\text{AppellF1}\Big[\frac{5}{2},\ 1+\frac{1}{2}\,(-1+m),\ 3,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{1}{5\,\left(a^2-b^2\right)}18\,a^2\,\text{AppellF1}\Big[\frac{5}{2},\ \frac{1}{2}\,(-1+m),\ 4,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\Bigg(-\frac{1}{5\,\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\Big[\frac{5}{2},\ \frac{1+m}{2},\ 3,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+$$

$$d\,x]-\frac{3}{5}\,(1+m)\,\text{AppellF1}\Big[\frac{5}{2},\ 1+\frac{1+m}{2},\ 2,\ \frac{7}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}\,(-1+m),\ 2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Bigg(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},$$

$$\frac{1}{2}\,(-1+m),\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1+m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\ \text{Tan}[c+d\,x]^2\Bigg)^2+$$

$$\Bigg(b\,\text{AppellF1}\Big[\frac{1}{2},\ \frac{m}{2},\ 2,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\ \Bigg(2\,\Bigg(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,m\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{2+m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\,\left(a^2-b^2\right)\ \Bigg(-\frac{1}{3}\,m\,\text{AppellF1}\Big[\frac{3}{2},\ 1+\frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{1}{3\,\left(a^2-b^2\right)}4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{m}{2},\ 3,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\ \text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)+$$

$$\text{Tan}[c+d x]^2 \left(4 a^2 \left(-\frac{3}{5} m \,\text{AppellF1}\left[\frac{5}{2}, 1+\frac{m}{2}, 3, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] - \frac{1}{5 \left(a^2-b^2\right)} 18 a^2 \,\text{AppellF1}\left[\frac{5}{2}, \frac{m}{2}, 4, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\right) + \left(a^2-b^2\right) m \left(-\frac{1}{5 \left(a^2-b^2\right)} 12 a^2 \,\text{AppellF1}\left[\frac{5}{2}, \frac{2+m}{2}, 3, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] - \frac{3}{5} (2+m) \,\text{AppellF1}\left[\frac{5}{2}, 1+\frac{2+m}{2}, 2, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\right)\right)\right)\right) \Big/$$

$$\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(4 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right)^2\Bigg)\Bigg)\Bigg)\Bigg)$$

- **Problem 778: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\sqrt{1-\text{Cos}[x]}}{\sqrt{a-\text{Cos}[x]}} \, dx$$

Optimal (type 3, 26 leaves, 2 steps):

$$-2 \,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\sqrt{1-\text{Cos}[x]} \sqrt{a-\text{Cos}[x]}}\right]$$

Result (type 3, 47 leaves):

$$i \sqrt{2-2 \text{Cos}[x]} \,\text{Csc}\left[\frac{x}{2}\right] \text{Log}\left[i \sqrt{2} \,\text{Cos}\left[\frac{x}{2}\right] + \sqrt{a-\text{Cos}[x]}\right]$$

- **Problem 788: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a \,\text{Cos}[c+d x])^{1/3} (A+B \,\text{Cos}[c+d x]) \, dx$$

Optimal (type 5, 102 leaves, 3 steps):

$$\frac{3 B (a+a \text{Cos}[c+d x])^{1/3} \text{Sin}[c+d x]}{4 d} + \frac{(4 A+B) (a+a \text{Cos}[c+d x])^{1/3} \text{Hypergeometric2F1}\left[\frac{1}{6}, \frac{1}{2}, \frac{3}{2}, \frac{1}{2} (1-\text{Cos}[c+d x])\right] \text{Sin}[c+d x]}{2 \times 2^{1/6} d (1+\text{Cos}[c+d x])^{5/6}}$$

Result (type 5, 213 leaves):

$$\frac{1}{32\,d}3\,(a\,(1+\text{Cos}[c+d\,x]))^{1/3}\left(-8\,(4\,A+B)\,\text{Cot}\left[\frac{c}{2}\right]+8\,B\,\text{Cos}[d\,x]\,\text{Sin}[c]+\left(2\,(4\,A+B)\,\text{Csc}\left[\frac{c}{4}\right]\right.\right.$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{3},\frac{1}{3},\frac{2}{3},-e^{i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])\right]+e^{i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{5}{3},-e^{i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])\right]\right)$$
$$\left.\text{Sec}\left[\frac{c}{4}\right]\left(1+e^{i\,d\,x}\,\text{Cos}[c]+i\,e^{i\,d\,x}\,\text{Sin}[c]\right)^{1/3}\right)\Big/\left(\left(1+e^{i\,d\,x}\right)\text{Cos}\left[\frac{c}{2}\right]+i\left(-1+e^{i\,d\,x}\right)\text{Sin}\left[\frac{c}{2}\right]\right)+8\,B\,\text{Cos}[c]\,\text{Sin}[d\,x]\right)$$

- **Problem 790: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

Optimal (type 5, 105 leaves, 3 steps):

$$\frac{3\,(A-B)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])^{2/3}}-\frac{2^{5/6}\,(A-2\,B)\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Hypergeometric2F1}\left[\frac{1}{6},\frac{1}{2},\frac{3}{2},\frac{1}{2}\,(1-\text{Cos}[c+d\,x])\right]\text{Sin}[c+d\,x]}{a\,d\,(1+\text{Cos}[c+d\,x])^{5/6}}$$

Result (type 5, 197 leaves):

$$\left(3\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-4\left((-2\,A+3\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]+B\,\text{Cos}\left[c+\frac{d\,x}{2}\right]\right)\text{Csc}\left[\frac{c}{2}\right]-(A-2\,B)\,e^{-\frac{1}{2}\,i\,d\,x}\,\text{Csc}\left[\frac{c}{4}\right]\right.\right.$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{3},\frac{1}{3},\frac{2}{3},-e^{i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])\right]+e^{i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{5}{3},-e^{i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])\right]\right)$$
$$\left.\left.\text{Sec}\left[\frac{c}{4}\right]\left(1+e^{i\,d\,x}\,\text{Cos}[c]+i\,e^{i\,d\,x}\,\text{Sin}[c]\right)^{1/3}\right)\right)\Big/\left(4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{2/3}\right)$$

- **Problem 922: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+d\,x])^n\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 5, 163 leaves, 4 steps):

$$-\left(2\,A\,\sqrt{\text{Cos}[c+d\,x]}\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}\,(1+2\,n),\frac{1}{4}\,(5+2\,n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/\left(d\,(1+2\,n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\left(2\,B\,\text{Cos}[c+d\,x]^{3/2}\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}\,(3+2\,n),\frac{1}{4}\,(7+2\,n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/\left(d\,(3+2\,n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)$$

Result (type 6, 4951 leaves):

$$\left(2\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{\frac{3}{2}+n}\text{Cos}[c+d\,x]^{-n}\,(b\,\text{Cos}[c+d\,x])^n\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}\right.$$
$$\left(\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+A\,\text{Cos}[c+d\,x]^{\frac{3}{2}+n}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2\,(c+d\,x)]+\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2\,(c+d\,x)]+\right.$$

$$\text{Sec}[c+d\,x]\left(-\frac{1}{2}\,\mathrm{i}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2\,(c+d\,x)]\,\text{Sin}[c+d\,x]+A\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[c+d\,x]^2+\right.$$
$$\left.\left.\left.\text{Sin}[c+d\,x]\left(-\frac{1}{2}\,\mathrm{i}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2\,(c+d\,x)]\right)\right)\right)\right)$$
$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\right/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\left(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.\right.$$
$$\left.\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$
$$\left(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right/$$
$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\left((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.\right.$$
$$\left.\left.\left.\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)\right)\right/$$
$$\left(3\,d\left(\frac{1}{3}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{\frac{1}{2}+n}\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}\left(\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.\right.\right.\right.\right.$$
$$\left.\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$
$$\left(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$
$$\left(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\Big/\left(-5\right.$$
$$\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\left((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)-$$
$$\frac{2}{3}\left(\frac{3}{2}+n\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{\frac{1}{2}+n}\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$
$$\left(\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\right.\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\left(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Bigg)+$$

$$\frac{2}{3}\left(-\frac{1}{2}+n\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{\frac{3}{2}+n}\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{3}{2}+n}\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]$$

$$\left(-\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sin}[c+d\,x]+\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

$$\left(\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\left(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Bigg)+$$

$$\frac{2}{3}\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{\frac{3}{2}+n}\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]$$

$$\Bigg(\Bigg(9\,(A+B)\,\left(-\frac{1}{3}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{3}{2}-n,$$

$$\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+\Bigg(5\,(-A+B)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\Bigg((3+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)-\Bigg(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\Bigg(\Bigg(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$3\left(-\frac{1}{3}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2\ (-(3+2\,n)\ (-\frac{3}{5}\ (\frac{5}{2}+n)\ \text{AppellF1}[\frac{5}{2},\ \frac{1}{2}-n,\ \frac{7}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]+\frac{3}{5}\ (\frac{1}{2}-n)\ \text{AppellF1}[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{5}{2}+n,\ \frac{7}{2},$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)])+(1-2\,n)$$

$$(-\frac{3}{5}\ (\frac{3}{2}+n)\ \text{AppellF1}[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{5}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]+$$

$$\frac{3}{5}\ (\frac{3}{2}-n)\ \text{AppellF1}[\frac{5}{2},\ \frac{5}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]))))\Big/$$

$$(3\,\text{AppellF1}[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{3}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]+(-(3+2\,n)\ \text{AppellF1}[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{5}{2}+n,\ \frac{5}{2},$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]+(1-2\,n)\ \text{AppellF1}[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2])$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2)^2-(5\ (-A+B)\ \text{AppellF1}[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2\ (((3+2\,n)\ \text{AppellF1}[\frac{5}{2},\ \frac{1}{2}-n,\ \frac{5}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]+$$

$$(-1+2\,n)\ \text{AppellF1}[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2])\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]-$$

$$5\ (-\frac{3}{5}\ (\frac{3}{2}+n)\ \text{AppellF1}[\frac{5}{2},\ \frac{1}{2}-n,\ \frac{5}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]+$$

$$\frac{3}{5}\ (\frac{1}{2}-n)\ \text{AppellF1}[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)])+$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2\ ((3+2\,n)\ (-\frac{5}{7}\ (\frac{5}{2}+n)\ \text{AppellF1}[\frac{7}{2},\ \frac{1}{2}-n,\ \frac{7}{2}+n,\ \frac{9}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]+\frac{5}{7}\ (\frac{1}{2}-n)\ \text{AppellF1}[\frac{7}{2},\ \frac{3}{2}-n,\ \frac{5}{2}+n,\ \frac{9}{2},$$

$$\text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)])+(-1+2\,n)$$

$$(-\frac{5}{7}\ (\frac{3}{2}+n)\ \text{AppellF1}[\frac{7}{2},\ \frac{3}{2}-n,\ \frac{5}{2}+n,\ \frac{9}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]+$$

$$\frac{5}{7}\ (\frac{3}{2}-n)\ \text{AppellF1}[\frac{7}{2},\ \frac{5}{2}-n,\ \frac{3}{2}+n,\ \frac{9}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]\ \text{Sec}[\frac{1}{2}(c+d\,x)]^2\ \text{Tan}[\frac{1}{2}(c+d\,x)]))))\Big/$$

$$(-5\,\text{AppellF1}[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}[\frac{1}{2}(c+d\,x)]^2,\ -\text{Tan}[\frac{1}{2}(c+d\,x)]^2]+((3+2\,n)\ \text{AppellF1}[\frac{5}{2},\ \frac{1}{2}-n,$$

$$\frac{5}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+$$

$$(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)^2\Big)\Big)\Big)$$

- **Problem 923: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+d\,x])^n\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 5, 163 leaves, 4 steps):

$$\frac{2\,A\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\ \frac{1}{4}(-1+2\,n),\ \frac{1}{4}(3+2\,n),\ \text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{d\,(1-2\,n)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sin}[c+d\,x]^2}}-$$

$$\left(2\,B\,\sqrt{\text{Cos}[c+d\,x]}\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\ \frac{1}{4}(1+2\,n),\ \frac{1}{4}(5+2\,n),\ \text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]\right)\Big/\left(d\,(1+2\,n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)$$

Result (type 6, 4842 leaves):

$$\Big(6\,\sqrt{\text{Cos}[c+d\,x]}\,(b\,\text{Cos}[c+d\,x])^n$$

$$\Big(A\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\text{Sec}[c+d\,x]\left(\frac{1}{2}B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2(c+d\,x)]+\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2(c+d\,x)]\right)+$$

$$\text{Sec}[c+d\,x]^2\Big(-\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2(c+d\,x)]\,\text{Sin}[c+d\,x]+A\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[c+d\,x]^2+$$

$$\text{Sin}[c+d\,x]\left(-\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2(c+d\,x)]\right)\Big)\Big)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]$$

$$\Big(\Big((A-B)\,\text{AppellF1}\left[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\Big((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+(-1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)+$$

$$\Big(2\,A\,\text{AppellF1}\left[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-\Big((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)\Big)\Big)\Big/$$

$$\Bigg(d\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^2\,\Bigg(-\frac{1}{\big(-1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)^3}\,12\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2$$

$$\Bigg(\Bigg((A-B)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-$$

$$n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-\Bigg((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)+$$

$$\Bigg(2\,A\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-\Bigg((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-3+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)\Bigg)+$$

$$\frac{1}{\big(-1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)^2}\,3\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Bigg(\Bigg((A-B)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-$$

$$\Bigg((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-1+2\,n)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)+$$

$$\Bigg(2\,A\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-\Bigg((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-3+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)\Bigg)-$$

$$\frac{1}{\big(-1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)^2}\,6\,\Big(\frac{1}{2}+n\Big)\,\text{Cos}[c+d\,x]^{-\frac{1}{2}+n}\,\text{Sin}[c+d\,x]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]$$

$$\Bigg(\Bigg((A-B)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Bigg)\Bigg/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$

$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(2\,A\,\text{AppellF1}\left[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.\left.(-3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{1}{\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\,6\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(\left((A-B)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$

$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left((A-B)\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$

$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$

$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(2\,A\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$

$$\left.\left.\frac{1}{3}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]-\right.$$

$$\left((1+2\,n)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]+(-3+2\,n)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\right)\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right)-$$

$$\left((A-B)\ \text{AppellF1}\left[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \left(-1+\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right)\right.$$

$$\left(-\left((1+2\,n)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]+(-1+2\,n)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\right.\right.\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\right)\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]+3\ \left(-\frac{1}{3}\ \left(\frac{1}{2}+n\right)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\right.\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]+\frac{1}{3}\ \left(\frac{1}{2}-n\right)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\right.$$

$$\left.\left.\frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]\right)-\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \left((1+2\,n)\ \left(-\frac{3}{5}\ \left(\frac{3}{2}+n\right)\right.\right.$$

$$\text{AppellF1}\left[\frac{5}{2},\ \frac{1}{2}-n,\ \frac{5}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]+\frac{3}{5}\ \left(\frac{1}{2}-n\right)$$

$$\left.\text{AppellF1}\left[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]\right)+(-1+2\,n)$$

$$\left(-\frac{3}{5}\ \left(\frac{1}{2}+n\right)\ \text{AppellF1}\left[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]+\right.$$

$$\left.\left.\left.\left.\left.\frac{3}{5}\ \left(\frac{3}{2}-n\right)\ \text{AppellF1}\left[\frac{5}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]\right)\right)\right)\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]-\left((1+2\,n)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\right.\right.\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]+(-1+2\,n)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\right)$$

$$\left.\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right)^2-\left(2\,A\,\text{AppellF1}\left[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\right.$$

$$\left(-\left((1+2\,n)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]+(-3+2\,n)\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\right)\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]+$$

$$3\ \left(-\frac{1}{3}\ \left(\frac{1}{2}+n\right)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]^2\right]\ \text{Sec}\left[\frac{1}{2}\ (c+d\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (c+d\,x)\right]+\right.$$

$$\frac{1}{3}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg((1+2n)\Bigg(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)+(-3+2n)\Bigg(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-\Bigg((1+2n)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-3+2n)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)^2\Bigg)\Bigg)$$

- **Problem 924: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+dx])^n\,(A+B\,\text{Cos}[c+dx])}{\text{Cos}[c+dx]^{5/2}}\,dx$$

Optimal (type 5, 163 leaves, 4 steps):

$$\frac{2A\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-3+2n),\frac{1}{4}(1+2n),\text{Cos}[c+dx]^2\right]\text{Sin}[c+dx]}{d\,(3-2n)\,\text{Cos}[c+dx]^{3/2}\sqrt{\text{Sin}[c+dx]^2}}+\frac{2B\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-1+2n),\frac{1}{4}(3+2n),\text{Cos}[c+dx]^2\right]\text{Sin}[c+dx]}{d\,(1-2n)\sqrt{\text{Cos}[c+dx]}\sqrt{\text{Sin}[c+dx]^2}}$$

Result (type 6, 4948 leaves):

$$\Bigg(2\,\text{Cos}[c+dx]^{-n}\,(b\,\text{Cos}[c+dx])^n\Bigg(A\,\text{Cos}[c+dx]^{-\frac{1}{2}+n}+\text{Sec}[c+dx]^2\left(\frac{1}{2}B\,\text{Cos}[c+dx]^{\frac{1}{2}+n}+\frac{1}{2}B\,\text{Cos}[c+dx]^{\frac{1}{2}+n}\text{Cos}[2(c+dx)]+\frac{1}{2}\,i\,B\,\text{Cos}[c+dx]^{\frac{1}{2}+n}\text{Sin}[2(c+dx)]\right)+\text{Sec}[c+dx]^3\left(-\frac{1}{2}\,i\,B\,\text{Cos}[c+dx]^{\frac{1}{2}+n}\text{Cos}[2(c+dx)]\,\text{Sin}[c+dx]+A\,\text{Cos}[c+dx]^{\frac{1}{2}+n}\text{Sin}[c+dx]^2+\right.$$

$$\mathrm{Sin}[c+d\,x]\left(-\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[2\,(c+d\,x)]\right)\Bigg)\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{5}{2}+n}$$

$$\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{-\frac{1}{2}+n}\Bigg(\Bigg(9\,(A+B)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\Big/$$

$$\Bigg(3\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\Bigg((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(5-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(5\,(-A+B)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Big/$$

$$\Bigg(-5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\Bigg((-1+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-5+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(3\,d\,\Bigg(-\frac{2}{3}\left(-\frac{5}{2}+n\right)\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{7}{2}+n}\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\Bigg(\Bigg(9\,(A+B)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\Big/\Bigg(3\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\right.$$

$$\left.\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\Bigg((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$(5-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(5\,(-A+B)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Big/$$

$$\Bigg(-5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$\Bigg((-1+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-5+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\right.$$

$$\left.\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Bigg)+\frac{1}{3}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{5}{2}+n}$$

$$\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{-\frac{1}{2}+n}\left(\left(9\,(A+B)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(5-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5\,(-A+B)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((-1+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.\left.(-5+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)-$$

$$\frac{2}{3}\left(-\frac{1}{2}+n\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{5}{2}+n}\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{1}{2}+n}$$

$$\left(\left(9\,(A+B)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\right.\right.\right.$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(5-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5\,(-A+B)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((-1+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-5+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Bigg)+$$

$$\frac{2}{3}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{5}{2}+n}\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\Bigg(\Bigg(9\,(A+B)\,\left(-\frac{1}{3}\left(-\frac{1}{2}+n\right)\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{5}{2}-n\right)\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\Bigg)\Big/$$

$$\Bigg(3\,\mathrm{AppellF1}\left[\frac{1}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{3}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$\left((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.(5-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+$$

$$\left(5\,(-A+B)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\Big/$$

$$\Bigg(-5\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$\Bigg((-1+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-5+2\,n)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,$$

$$-\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Big]\Bigg)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+\Bigg(5\,(-A+B)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{5}{2}-n\right)\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\Bigg)\Big/$$

$$\Bigg(-5\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\Bigg((-1+2\,n)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},$$

$$\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Big]+(-5+2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)$$

$$\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)-\Bigg(9\,(A+B)\,\mathrm{AppellF1}\left[\frac{1}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{3}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]$$

$$\Bigg(\Bigg((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$(5-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$3\,\Big(-\frac{1}{3}\,\Big(-\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{1}{3}\,\Big(\frac{5}{2}-n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)+$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big((1-2\,n)\,\Big(-\frac{3}{5}\,\Big(\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{5}{2}-n,\,\frac{3}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+\frac{3}{5}\,\Big(\frac{5}{2}-n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)+(5-2\,n)$$

$$\Big(-\frac{3}{5}\,\Big(-\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{3}{5}\,\Big(\frac{7}{2}-n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+\Big((1-2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(5-2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^2-\Big(5\,(-A+B)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(\Big((-1+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-5+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-$$

$$5\,\Big(-\frac{3}{5}\,\Big(-\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{3}{5}\,\Big(\frac{5}{2}-n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)+$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big((-1+2\,n)\,\Big(-\frac{5}{7}\,\Big(\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{5}{2}-n,\,\frac{3}{2}+n,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+\frac{5}{7}\,\Big(\frac{5}{2}-n\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{9}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)+(-5+2\,n)$$

$$\Big(-\frac{5}{7}\,\Big(-\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{5}{7}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$
$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Bigg((-1+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$
$$(-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)^2\Bigg)\Bigg)$$

- **Problem 925: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+d x])^n\,(A+B\,\text{Cos}[c+d x])}{\text{Cos}[c+d x]^{7/2}}\,dx$$

Optimal (type 5, 163 leaves, 4 steps):

$$\frac{2A\,(b\,\text{Cos}[c+d x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-5+2n),\frac{1}{4}(-1+2n),\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{d\,(5-2n)\,\text{Cos}[c+d x]^{5/2}\sqrt{\text{Sin}[c+d x]^2}}+$$
$$\frac{2B\,(b\,\text{Cos}[c+d x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-3+2n),\frac{1}{4}(1+2n),\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{d\,(3-2n)\,\text{Cos}[c+d x]^{3/2}\sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 6, 4948 leaves):

$$\Bigg(2\,\text{Cos}[c+d x]^{-n}\,(b\,\text{Cos}[c+d x])^n$$
$$\Bigg(A\,\text{Cos}[c+d x]^{-\frac{3}{2}+n}+\text{Sec}[c+d x]^3\left(\frac{1}{2}B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2}B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Cos}[2(c+d x)]+\frac{1}{2}\,i\,B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Sin}[2(c+d x)]\right)+$$
$$\text{Sec}[c+d x]^4\Bigg(-\frac{1}{2}\,i\,B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Cos}[2(c+d x)]\,\text{Sin}[c+d x]+A\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Sin}[c+d x]^2+$$
$$\text{Sin}[c+d x]\left(-\frac{1}{2}\,i\,B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2}B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Sin}[2(c+d x)]\right)\Bigg)\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{7}{2}+n}$$
$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{3}{2}+n}\Bigg(\Bigg(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\Bigg/$$
$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Bigg((3-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.$$

$$-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]+(7-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)+$$

$$\Big(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Big((-3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(-7+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big)\Big)\Big/$$

$$\Big(3 d\Big(-\frac{2}{3}\left(-\frac{7}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{9}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{3}{2}+n}$$

$$\Big(\Big(9(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\Big/\Big(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Big((3-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(7-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)+$$

$$\Big(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Big((-3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-7+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\right.$$

$$\left.\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big)+\frac{1}{3}\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{7}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{3}{2}+n}\Big(\Big(9(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Big((3-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(7-2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\,+$$

$$\Big(5\,(-A+B)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,+$$

$$\Big((-3+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,+$$

$$(-7+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)\,-$$

$$\frac{2}{3}\,\Big(-\frac{3}{2}+n\Big)\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{7}{2}+n}\,\left(\frac{1}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\right)^{-\frac{1}{2}+n}$$

$$\Big(\Big(9\,(A+B)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+\Big((3-2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,+$$

$$(7-2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\,+$$

$$\Big(5\,(-A+B)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,+$$

$$\Big((-3+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,+$$

$$(-7+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)\,+$$

$$\frac{2}{3}\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\Big(1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{7}{2}+n}\,\left(\frac{1}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\right)^{-\frac{3}{2}+n}$$

$$\Big(\Big(9\,(A+B)\,\Big(-\frac{1}{3}\,\Big(-\frac{3}{2}+n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,+$$

$$\frac{1}{3}\,\Big(\frac{7}{2}-n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((3-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(7-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((-3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-7+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$\left.\left.\left.\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+\left(5\,(-A+B)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$

$$\left(-\frac{3}{5}\left(-\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\left.\frac{3}{5}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((-3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\right.\right.\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-7+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{7}{2}-n,\,-\frac{3}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$

$$\left(\left((3-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.\right.$$

$$\left.(7-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$3\left(-\frac{1}{3}\left(-\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left((3-2\,n)\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\text{Tan}[\tfrac{1}{2}(c+d\,x)]]) + (7-2n)\,(-\tfrac{3}{5}(-\tfrac{3}{2}+n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)] + \tfrac{3}{5}(\tfrac{9}{2}-n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{11}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]])))) \Big/ (3\,\text{AppellF1}[\tfrac{1}{2}, \tfrac{7}{2}-n, -\tfrac{3}{2}+n, \tfrac{3}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2] +$$

$$((3-2n)\,\text{AppellF1}[\tfrac{3}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2] + (7-2n)\,\text{AppellF1}[\tfrac{3}{2},$$

$$\tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2])\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2)^2 -$$

$$(5\,(-A+B)\,\text{AppellF1}[\tfrac{3}{2}, \tfrac{7}{2}-n, -\tfrac{3}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2$$

$$(((-3+2n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2] +$$

$$(-7+2n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2])\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)] -$$

$$5\,(-\tfrac{3}{5}(-\tfrac{3}{2}+n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)] +$$

$$\tfrac{3}{5}(\tfrac{7}{2}-n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]) +$$

$$\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2\,((-3+2n)\,(-\tfrac{5}{7}(-\tfrac{1}{2}+n)\,\text{AppellF1}[\tfrac{7}{2}, \tfrac{7}{2}-n, \tfrac{1}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)] + \tfrac{5}{7}(\tfrac{7}{2}-n)\,\text{AppellF1}[\tfrac{7}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]]) + (-7+2n)\,(-\tfrac{5}{7}(-\tfrac{3}{2}+n)\,\text{AppellF1}[\tfrac{7}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,$$

$$-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)] + \tfrac{5}{7}(\tfrac{9}{2}-n)\,\text{AppellF1}[\tfrac{7}{2}, \tfrac{11}{2}-n, -\tfrac{3}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,$$

$$-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]])))) \Big/ (-5\,\text{AppellF1}[\tfrac{3}{2}, \tfrac{7}{2}-n, -\tfrac{3}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,$$

$$-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2] + ((-3+2n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2] +$$

$$(-7+2n)\,\text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d\,x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2])\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2)^2)))$$

- **Problem 926: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(b \operatorname{Cos}[c+d x])^n (A+B \operatorname{Cos}[c+d x])}{\operatorname{Cos}[c+d x]^{9/2}} \, dx$$

Optimal (type 5, 163 leaves, 4 steps):

$$\frac{2 A (b \operatorname{Cos}[c+d x])^n \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{4} (-7+2 n), \frac{1}{4} (-3+2 n), \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (7-2 n) \operatorname{Cos}[c+d x]^{7/2} \sqrt{\operatorname{Sin}[c+d x]^2}} + \frac{2 B (b \operatorname{Cos}[c+d x])^n \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{4} (-5+2 n), \frac{1}{4} (-1+2 n), \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (5-2 n) \operatorname{Cos}[c+d x]^{5/2} \sqrt{\operatorname{Sin}[c+d x]^2}}$$

Result (type 6, 4948 leaves):

$$\left(2 \operatorname{Cos}[c+d x]^{-n} (b \operatorname{Cos}[c+d x])^n \right.$$

$$\left(A \operatorname{Cos}[c+d x]^{-\frac{5}{2}+n} + \operatorname{Sec}[c+d x]^4 \left(\frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} + \frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[2 (c+d x)] + \frac{1}{2} i B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[2 (c+d x)]\right) + \right.$$

$$\operatorname{Sec}[c+d x]^5 \left(-\frac{1}{2} i B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[2 (c+d x)] \operatorname{Sin}[c+d x] + A \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[c+d x]^2 + \right.$$

$$\left.\left.\operatorname{Sin}[c+d x] \left(-\frac{1}{2} i B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} + \frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[2 (c+d x)]\right)\right)\right) \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right] \left(1-\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)^{-\frac{9}{2}+n}$$

$$\left(\frac{1}{1+\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2}\right)^{-\frac{5}{2}+n} \left(\left(9 (A+B) \operatorname{AppellF1}\left[\frac{1}{2}, \frac{9}{2}-n, -\frac{5}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \right/$$

$$\left(3 \operatorname{AppellF1}\left[\frac{1}{2}, \frac{9}{2}-n, -\frac{5}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \left((5-2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{9}{2}-n, -\frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, \right.\right.$$

$$\left.\left. -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + (9-2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{11}{2}-n, -\frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) +$$

$$\left(5 (-A+B) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{9}{2}-n, -\frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) \Big/$$

$$\left(-5 \operatorname{AppellF1}\left[\frac{3}{2}, \frac{9}{2}-n, -\frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \right.$$

$$\left((-5+2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{9}{2}-n, -\frac{3}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \right.$$

$$(-9+2\,n)\;\text{AppellF1}\Big[\frac{5}{2},\;\frac{11}{2}-n,\;-\frac{5}{2}+n,\;\frac{7}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)\Big)\Big/$$

$$\Bigg(3\,d\,\Bigg(-\frac{2}{3}\,\Big(-\frac{9}{2}+n\Big)\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{11}{2}+n}\,\left(\frac{1}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\right)^{-\frac{5}{2}+n}$$

$$\Big(\Big(9\,(A+B)\;\text{AppellF1}\Big[\frac{1}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{3}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\Big/\;\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+\Big((5-2\,n)\;\text{AppellF1}\Big[\frac{3}{2},\;\frac{9}{2}-n,\;-\frac{3}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(9-2\,n)\;\text{AppellF1}\Big[\frac{3}{2},\;\frac{11}{2}-n,\;-\frac{5}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(5\,(-A+B)\;\text{AppellF1}\Big[\frac{3}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\Big[\frac{3}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big((-5+2\,n)\;\text{AppellF1}\Big[\frac{5}{2},\;\frac{9}{2}-n,\;-\frac{3}{2}+n,\;\frac{7}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-9+2\,n)\;\text{AppellF1}\Big[\frac{5}{2},\;\frac{11}{2}-n,\;-\frac{5}{2}+n,$$

$$\frac{7}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)+\frac{1}{3}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{9}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\right)^{-\frac{5}{2}+n}\;\Big(\Big(9\,(A+B)\;\text{AppellF1}\Big[\frac{1}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{3}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{3}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big((5-2\,n)\;\text{AppellF1}\Big[\frac{3}{2},\;\frac{9}{2}-n,\;-\frac{3}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(9-2\,n)\;\text{AppellF1}\Big[\frac{3}{2},\;\frac{11}{2}-n,\;-\frac{5}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(5\,(-A+B)\;\text{AppellF1}\Big[\frac{3}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\Big[\frac{3}{2},\;\frac{9}{2}-n,\;-\frac{5}{2}+n,\;\frac{5}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big((-5+2\,n)\;\text{AppellF1}\Big[\frac{5}{2},\;\frac{9}{2}-n,\;-\frac{3}{2}+n,\;\frac{7}{2},\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\;-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-9+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)-$$

$$\frac{2}{3}\left(-\frac{5}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{9}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{-\frac{3}{2}+n}$$

$$\Bigg(\Bigg(9(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{3}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\Bigg((5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(9-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-9+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)+$$

$$\frac{2}{3}\text{Tan}\left[\frac{1}{2}(c+dx)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{9}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{-\frac{5}{2}+n}$$

$$\Bigg(\Bigg(9(A+B)\left(-\frac{1}{3}\left(-\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{9}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(9-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left((-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-9+2n)\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$
$$\left.\left.\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+\Bigg(5\,(-A+B)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2$$
$$\left(-\frac{3}{5}\left(-\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$
$$\left.\frac{3}{5}\left(\frac{9}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg/$$
$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\right.\right.\right.$$
$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-9+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)$$
$$\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-\Bigg(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$
$$\Bigg(\Bigg((5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$
$$\left.(9-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$
$$3\left(-\frac{1}{3}\left(-\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$
$$\left.\frac{1}{3}\left(\frac{9}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$
$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg((5-2n)\left(-\frac{3}{5}\left(-\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$
$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\left(\frac{9}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$
$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(9-2n)\left(-\frac{3}{5}\left(-\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.$$
$$\left.-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\left(\frac{11}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{13}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.$$
$$\left.\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\Bigg)\Bigg/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.$$
$$\left.-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$(9-2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)^2-$$

$$\Big(5(-A+B)\,\text{AppellF1}\Big[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2$$

$$\Big(\Big(\Big((-5+2n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-9+2n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]-$$

$$5\Big(-\frac{3}{5}\Big(-\frac{5}{2}+n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+$$

$$\frac{3}{5}\Big(\frac{9}{2}-n\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)+$$

$$\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big((-5+2n)\Big(-\frac{5}{7}\Big(-\frac{3}{2}+n\Big)\,\text{AppellF1}\Big[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+\frac{5}{7}\Big(\frac{9}{2}-n\Big)\,\text{AppellF1}\Big[\frac{7}{2},\frac{11}{2}-n,-\frac{3}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)+(-9+2n)\Big(-\frac{5}{7}\Big(-\frac{5}{2}+n\Big)\,\text{AppellF1}\Big[\frac{7}{2},\frac{11}{2}-n,-\frac{3}{2}+n,$$

$$\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+\frac{5}{7}\Big(\frac{11}{2}-n\Big)$$

$$\text{AppellF1}\Big[\frac{7}{2},\frac{13}{2}-n,-\frac{5}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\Big[\frac{3}{2},\frac{9}{2}-n,-\frac{5}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+\Big((-5+2n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{9}{2}-n,$$

$$-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-9+2n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{11}{2}-n,-\frac{5}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)^2\Big)\Big)\Big)$$

- **Problem 930: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^m\,(A+B\,\text{Cos}[c+d x])}{(b\,\text{Cos}[c+d x])^{1/3}}\,dx$$

Optimal (type 5, 167 leaves, 4 steps):

$$-\frac{3\,A\,\text{Cos}[c+d\,x]^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{6}\,(2+3\,m),\,\frac{1}{6}\,(8+3\,m),\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{d\,(2+3\,m)\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}-\frac{3\,B\,\text{Cos}[c+d\,x]^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{6}\,(5+3\,m),\,\frac{1}{6}\,(11+3\,m),\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{d\,(5+3\,m)\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 4959 leaves) :

$$\Bigg(2\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{\frac{5}{3}+m}\,\text{Cos}[c+d\,x]^{1/3}\,\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}$$

$$\Bigg(\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}+A\,\text{Cos}[c+d\,x]^{\frac{5}{3}+m}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[2\,(c+d\,x)]+\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[2\,(c+d\,x)]+$$

$$\text{Sec}[c+d\,x]\,\Bigg(-\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[2\,(c+d\,x)]\,\text{Sin}[c+d\,x]+A\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[c+d\,x]^2+$$

$$\text{Sin}[c+d\,x]\,\left(-\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[2\,(c+d\,x)]\right)\Bigg)\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\Bigg(\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+2\,\Bigg(-(5+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(1-3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+$$

$$\left(5\,(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\Big/$$

$$\Bigg(-15\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+2\,\Bigg((5+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-1+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\Bigg(\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{\frac{2}{3}+m}\,\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}$$

$$\Bigg(\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+2\,\Bigg(-(5+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$(1-3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)+$$

$$\Big(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)\Big/$$

$$\Big(-15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$2\Big((5+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-1+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)\Big)-$$

$$2\left(\frac{5}{3}+m\right)\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]^2\right)^{\frac{2}{3}+m}\left(\text{Cos}[c+dx]\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{1}{3}+m}\text{Sin}\left[\frac{1}{2}(c+dx)\right]^2$$

$$\Big(\Big(9(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\Big/\Big(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+2\Big(-(5+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(1-3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)+$$

$$\Big(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)\Big/$$

$$\Big(-15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$2\Big((5+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-1+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)\Big)+$$

$$2\left(-\frac{1}{3}+m\right)\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]^2\right)^{\frac{5}{3}+m}\left(\text{Cos}[c+dx]\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{4}{3}+m}\text{Tan}\left[\frac{1}{2}(c+dx)\right]$$

$$\left(-\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Sin}[c+dx]+\text{Cos}[c+dx]\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)$$

$$\Big(\Big(9(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\Big/$$

$$\Big(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$2\left(-(5+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.(1-3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)+$$

$$\left(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\Big/$$

$$\left(-15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$2\left((5+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.\left.(-1+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)+$$

$$2\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]^2\right)^{\frac{5}{3}+m}\left(\text{Cos}[c+dx]\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{1}{3}+m}\text{Tan}\left[\frac{1}{2}(c+dx)\right]$$

$$\left(\left(9(A+B)\left(-\frac{1}{3}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.\right.\right.$$

$$\left.\left.\frac{1}{3}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$2\left(-(5+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.(1-3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)+$$

$$\left(5(-A+B)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Big/$$

$$\left(-15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$2\left((5+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-1+3m)\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$\left.\left.\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)+\left(5(-A+B)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right.$$

$$\left(-\frac{3}{5}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\left.\frac{3}{5}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/$$

$$\Bigg(-15\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{5}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]+2\Big((5+3m)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},$$

$$\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]+(-1+3m)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{5}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\Big)$$

$$\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Bigg)-\Bigg(9\,(A+B)\,\text{AppellF1}\Big[\tfrac{1}{2},\tfrac{1}{3}-m,\tfrac{5}{3}+m,\tfrac{3}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]$$

$$\Bigg(2\Big(-(5+3m)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]+$$

$$(1-3m)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{4}{3}-m,\tfrac{5}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\Big)\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]+$$

$$9\Big(-\tfrac{1}{3}\Big(\tfrac{5}{3}+m\Big)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]+$$

$$\tfrac{1}{3}\Big(\tfrac{1}{3}-m\Big)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{4}{3}-m,\tfrac{5}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]\Big)+$$

$$2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Bigg(-(5+3m)\Big(-\tfrac{3}{5}\Big(\tfrac{8}{3}+m\Big)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{11}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]$$

$$\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]+\tfrac{3}{5}\Big(\tfrac{1}{3}-m\Big)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},$$

$$\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]\Big)+(1-3m)$$

$$\Big(-\tfrac{3}{5}\Big(\tfrac{5}{3}+m\Big)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]+$$

$$\tfrac{3}{5}\Big(\tfrac{4}{3}-m\Big)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{7}{3}-m,\tfrac{5}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]\Big)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(9\,\text{AppellF1}\Big[\tfrac{1}{2},\tfrac{1}{3}-m,\tfrac{5}{3}+m,\tfrac{3}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]+2\Big(-(5+3m)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{5}{2},$$

$$\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]+(1-3m)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{4}{3}-m,\tfrac{5}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\Big)$$

$$\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Bigg)^2-\Bigg(5\,(-A+B)\,\text{AppellF1}\Big[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{5}{3}+m,\tfrac{5}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]$$

$$\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Bigg(2\Big((5+3m)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]+$$

$$(-1+3m)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{5}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\Big)\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]-$$

$$15\Big(-\tfrac{3}{5}\Big(\tfrac{5}{3}+m\Big)\,\text{AppellF1}\Big[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2,-\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]^2\Big]\,\text{Sec}\big[\tfrac{1}{2}(c+d\,x)\big]^2\,\text{Tan}\big[\tfrac{1}{2}(c+d\,x)\big]+$$

$$\frac{3}{5}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+$$
$$2\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg((5+3 m)\Bigg(-\frac{5}{7}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$
$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{5}{7}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\right.$$
$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+(-1+3 m)$$
$$\Bigg(-\frac{5}{7}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$
$$\frac{5}{7}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$
$$\Bigg(-15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+2\Bigg((5+3 m)\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\right.$$
$$\left.\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$
$$(-1+3 m)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)^2\Bigg)\Bigg)\Bigg)$$

- **Problem 931: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^m(A+B\,\text{Cos}[c+d x])}{(b\,\text{Cos}[c+d x])^{2/3}}\,dx$$

Optimal (type 5, 167 leaves, 4 steps):

$$-\frac{3 A\,\text{Cos}[c+d x]^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{6}(1+3 m),\frac{1}{6}(7+3 m),\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{d(1+3 m)(b\,\text{Cos}[c+d x])^{2/3}\sqrt{\text{Sin}[c+d x]^2}}-$$
$$\frac{3 B\,\text{Cos}[c+d x]^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{6}(4+3 m),\frac{1}{6}(10+3 m),\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{d(4+3 m)(b\,\text{Cos}[c+d x])^{2/3}\sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 6, 4951 leaves):

$$\Bigg(2\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{4}{3}+m}\text{Cos}[c+d x]^{2/3}\left(\text{Cos}[c+d x]\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{2}{3}+m}$$
$$\Bigg(\frac{1}{2}B\,\text{Cos}[c+d x]^{\frac{1}{3}+m}+A\,\text{Cos}[c+d x]^{\frac{4}{3}+m}+\frac{1}{2}B\,\text{Cos}[c+d x]^{\frac{1}{3}+m}\text{Cos}[2(c+d x)]+\frac{1}{2}i\,B\,\text{Cos}[c+d x]^{\frac{1}{3}+m}\text{Sin}[2(c+d x)]+$$

$$\text{Sec}[c+d x]\left(-\frac{1}{2} i B \text{Cos}[c+d x]^{\frac{1}{3}+m} \text{Cos}[2 (c+d x)] \text{Sin}[c+d x]+A \text{Cos}[c+d x]^{\frac{1}{3}+m} \text{Sin}[c+d x]^2+\right.$$

$$\left.\left.\left.\text{Sin}[c+d x]\left(-\frac{1}{2} i B \text{Cos}[c+d x]^{\frac{1}{3}+m}+\frac{1}{2} B \text{Cos}[c+d x]^{\frac{1}{3}+m} \text{Sin}[2 (c+d x)]\right)\right)\right)\right)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]\left(\left(9 (A+B) \text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\right/$$

$$\left(9 \text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-2\left((4+3 m) \text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-2+3 m) \text{AppellF1}\left[\frac{3}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(5 (A-B) \text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$

$$\left(15 \text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-2\left((4+3 m) \text{AppellF1}\left[\frac{5}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-2+3 m) \text{AppellF1}\left[\frac{5}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\right)\Big/$$

$$\left(d (b \text{Cos}[c+d x])^{2/3}\left(\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{1}{3}+m}\left(\text{Cos}[c+d x] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{2}{3}+m}\right.\right.$$

$$\left(\left(9 (A+B) \text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\left(9 \text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2},\right.\right.\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-2\left((4+3 m) \text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.(-2+3 m) \text{AppellF1}\left[\frac{3}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(5 (A-B) \text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/\left(15 \text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m,\right.\right.$$

$$\left.\frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-2\left((4+3 m) \text{AppellF1}\left[\frac{5}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.\left.(-2+3 m) \text{AppellF1}\left[\frac{5}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)-$$

$$2\left(\frac{4}{3}+m\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{1}{3}+m}\left(\text{Cos}[c+d x] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{2}{3}+m} \text{Sin}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\left(\left(9 (A+B) \text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\left(9 \text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2},\right.\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] - 2\left((4+3 m)\,\text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.(-2+3 m)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg) +$$

$$\left(5 (A-B)\,\text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] -\right.$$

$$2\left((4+3 m)\,\text{AppellF1}\left[\frac{5}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.\left.(-2+3 m)\,\text{AppellF1}\left[\frac{5}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Bigg) +$$

$$2\left(-\frac{2}{3}+m\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{4}{3}+m}\left(\text{Cos}[c+d x]\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{5}{3}+m} \text{Tan}\left[\frac{1}{2}(c+d x)\right]$$

$$\left(-\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Sin}[c+d x] + \text{Cos}[c+d x]\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)$$

$$\left(\left(9 (A+B)\,\text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \Big/\right.$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] -\right.$$

$$2\left((4+3 m)\,\text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.(-2+3 m)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg) +$$

$$\left(5 (A-B)\,\text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2}, \frac{2}{3}-m, \frac{4}{3}+m, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] -\right.$$

$$2\left((4+3 m)\,\text{AppellF1}\left[\frac{5}{2}, \frac{2}{3}-m, \frac{7}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.\left.(-2+3 m)\,\text{AppellF1}\left[\frac{5}{2}, \frac{5}{3}-m, \frac{4}{3}+m, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Bigg) +$$

$$2\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{4}{3}+m}\left(\text{Cos}[c+d x]\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{2}{3}+m} \text{Tan}\left[\frac{1}{2}(c+d x)\right]$$

$$\left(\left(9\,(A+B)\left(-\frac{1}{3}\left(\frac{4}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.\right.$$

$$\left.\left.\frac{1}{3}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$

$$2\left((4+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5\,(A-B)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$

$$2\left((4+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-2+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$\left.\left.\left.\frac{5}{3}-m,\frac{4}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+\left(5\,(A-B)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$

$$\left(-\frac{3}{5}\left(\frac{4}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\left.\frac{3}{5}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-2\left((4+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\right.\right.\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-2+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-\left(9\,(A+B)\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$

$$\left(-2\left((4+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.\right.$$

$$\left.(-2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$9\left(-\frac{1}{3}\left(\frac{4}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)-$$

$$2\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left((4+3m)\left(-\frac{3}{5}\left(\frac{7}{3}+m\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$
$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\left(\frac{2}{3}-m\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\right.$$
$$\left.\left.\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(-2+3m)$$
$$\left(-\frac{3}{5}\left(\frac{4}{3}+m\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$
$$\left.\left.\left.\left.\left.\frac{3}{5}\left(\frac{5}{3}-m\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{8}{3}-m,\frac{4}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)\right)\Big/$$
$$\left(9\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-2\left((4+3m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\right.\right.\right.$$
$$\left.\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-2+3m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)$$
$$\left.\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2-\left(5\,(A-B)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$
$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(-2\left((4+3m)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.\right.$$
$$\left.(-2+3m)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$
$$15\left(-\frac{3}{5}\left(\frac{4}{3}+m\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$
$$\left.\frac{3}{5}\left(\frac{2}{3}-m\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{4}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)-$$
$$2\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left((4+3m)\left(-\frac{5}{7}\left(\frac{7}{3}+m\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$
$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{5}{7}\left(\frac{2}{3}-m\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\right.$$
$$\left.\left.\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(-2+3m)$$
$$\left(-\frac{5}{7}\left(\frac{4}{3}+m\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$
$$\left.\left.\left.\left.\left.\frac{5}{7}\left(\frac{5}{3}-m\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{8}{3}-m,\frac{4}{3}+m,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)\right)\Big/$$
$$\left(15\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{4}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-2\left((4+3m)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\right.\right.\right.$$

$$\frac{7}{3}+m,\ \frac{7}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+$$

$$(-2+3\,m)\ \mathrm{AppellF1}\left[\frac{5}{2},\ \frac{5}{3}-m,\ \frac{4}{3}+m,\ \frac{7}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)^2\Big)\Big)\Big)$$

## Problem 932: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{\mathrm{Cos}[c+d\,x]^m\,(A+B\,\mathrm{Cos}[c+d\,x])}{(b\,\mathrm{Cos}[c+d\,x])^{4/3}}\,dx$$

Optimal (type 5, 171 leaves, 4 steps):

$$\frac{3\,A\,\mathrm{Cos}[c+d\,x]^m\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\ \frac{1}{6}(-1+3\,m),\ \frac{1}{6}(5+3\,m),\ \mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{b\,d\,(1-3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}\sqrt{\mathrm{Sin}[c+d\,x]^2}}-$$

$$\frac{3\,B\,\mathrm{Cos}[c+d\,x]^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\ \frac{1}{6}(2+3\,m),\ \frac{1}{6}(8+3\,m),\ \mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{b\,d\,(2+3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

Result (type 6, 4853 leaves):

$$\Big(18\,\mathrm{Cos}[c+d\,x]^{2+m}$$

$$\Big(A\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\mathrm{Sec}[c+d\,x]\left(\frac{1}{2}B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Cos}[2\,(c+d\,x)]+\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Sin}[2\,(c+d\,x)]\right)+$$

$$\mathrm{Sec}[c+d\,x]^2\Big(-\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Cos}[2\,(c+d\,x)]\,\mathrm{Sin}[c+d\,x]+A\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Sin}[c+d\,x]^2+$$

$$\mathrm{Sin}[c+d\,x]\left(-\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Sin}[2\,(c+d\,x)]\right)\Big)\Big)\Big)\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]$$

$$\Big(\Big((A-B)\ \mathrm{AppellF1}\left[\frac{1}{2},\ \frac{1}{3}-m,\ \frac{2}{3}+m,\ \frac{3}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big)\Big/$$

$$\Big(9\,\mathrm{AppellF1}\left[\frac{1}{2},\ \frac{1}{3}-m,\ \frac{2}{3}+m,\ \frac{3}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\Big(-(2+3\,m)\ \mathrm{AppellF1}\left[\frac{3}{2},\ \frac{1}{3}-m,\ \frac{5}{3}+m,\ \frac{5}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.$$

$$\left.-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\ \mathrm{AppellF1}\left[\frac{3}{2},\ \frac{4}{3}-m,\ \frac{2}{3}+m,\ \frac{5}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)+$$

$$\Big(2\,A\,\mathrm{AppellF1}\left[\frac{1}{2},\ \frac{4}{3}-m,\ \frac{2}{3}+m,\ \frac{3}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\Big/\Big(9\,\mathrm{AppellF1}\Big[\frac{1}{2},\ \frac{4}{3}-m,\ \frac{2}{3}+m,\ \frac{3}{2},$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-2\Big((2+3\,m)\ \mathrm{AppellF1}\left[\frac{3}{2},\ \frac{4}{3}-m,\ \frac{5}{3}+m,\ \frac{5}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-4+3\,m)\ \mathrm{AppellF1}\left[\frac{3}{2},\ \frac{7}{3}-m,\ \frac{2}{3}+m,\ \frac{5}{2},\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\ -\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Big)\ \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)\Big)\Big)\Big/$$

$$\left(d\,(b\,\text{Cos}[c+d\,x])^{4/3}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\left(-\frac{1}{\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^3}36\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right.\right.$$

$$\left(\left((A-B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\middle/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-\right.\right.\right.$$

$$m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+2\left(-(2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(2\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\middle/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-2\left((2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{1}{\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}9\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\left(\left((A-B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\middle/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$2\left(-(2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(2\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\middle/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-2\left((2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)-$$

$$\frac{1}{\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}18\left(\frac{2}{3}+m\right)\text{Cos}[c+d\,x]^{-\frac{1}{3}+m}\,\text{Sin}[c+d\,x]\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]$$

$$\left(\left((A-B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\middle/\right.$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$2\left(-(2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(2\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\right.\right.$$
$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-2\left((2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$
$$\frac{1}{\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\,18\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(\left(\left((A-B)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.\right.$$
$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$2\left(-(2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left((A-B)\left(-\frac{1}{3}\left(\frac{2}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$
$$\left.\frac{1}{3}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$
$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$2\left(-(2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(2\,A\left(-\frac{1}{3}\left(\frac{2}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$
$$\left.\left.\frac{1}{3}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\Big(9\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{4}{3}-m,\,\frac{2}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]-$$

$$2\,\Big((2+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+(-4+3\,m)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{3}-m,\,\frac{2}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)-$$

$$\Big((A-B)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{2}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\Big(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)$$

$$\Big(2\,\Big(-(2+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+(1-3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{2}{3}+m,\,\frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\Big)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+9\,\Big(-\frac{1}{3}\Big(\frac{2}{3}+m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,$$

$$\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{1}{3}\Big(\frac{1}{3}-m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{2}{3}+m,\,\frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Big)+2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\,\Big(-(2+3\,m)\,\Big(-\frac{3}{5}\Big(\frac{5}{3}+m\Big)$$

$$\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\Big(\frac{1}{3}-m\Big)$$

$$\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Big)+(1-3\,m)$$

$$\Big(-\frac{3}{5}\Big(\frac{2}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\frac{3}{5}\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{2}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Big)\Big)\Big)\Big)\Big/$$

$$\Big(9\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{2}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+2\,\Big(-(2+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+(1-3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{2}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\Big)$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)^2-\Big(2\,A\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{4}{3}-m,\,\frac{2}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]$$

$$\Big(-2\,\Big((2+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+(-4+3\,m)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{3}-m,\,\frac{2}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\Big)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$9\,\Big(-\frac{1}{3}\Big(\frac{2}{3}+m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\frac{1}{3}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)-$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg((2+3m)\Bigg(-\frac{3}{5}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+(-4+3m)\Bigg(-\frac{3}{5}\left(\frac{2}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{7}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{10}{3}-m,\frac{2}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{2}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-2\Bigg((2+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(-4+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{2}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)^2\Bigg)\Bigg)$$

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# Test results for the 4 problems in "4.2.2.2 (g sin)^p (a+b cos)^m (c+d cos)^n.m"

- **Problem 1: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{d\,\text{Cos}[e+f x]}\,\sqrt{g\,\text{Sin}[e+f x]}}{a+b\,\text{Cos}[e+f x]}\,dx$$

Optimal (type 4, 509 leaves, 16 steps) :

$$-\frac{\sqrt{d}\,\sqrt{g}\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{d}\,\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{g}\,\sqrt{d\,\text{Cos}[e+f\,x]}}\right]}{\sqrt{2}\,b\,f}+\frac{\sqrt{d}\,\sqrt{g}\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{d}\,\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{g}\,\sqrt{d\,\text{Cos}[e+f\,x]}}\right]}{\sqrt{2}\,b\,f}+$$

$$\frac{2\sqrt{2}\,a\,d\,\sqrt{g}\,\sqrt{\text{Cos}[e+f\,x]}\,\text{EllipticPi}\left[-\frac{\sqrt{-a+b}}{\sqrt{a+b}},\,\text{ArcSin}\left[\frac{\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{g}\,\sqrt{1+\text{Cos}[e+f\,x]}}\right],\,-1\right]}{b\,\sqrt{-a+b}\,\sqrt{a+b}\,f\,\sqrt{d\,\text{Cos}[e+f\,x]}}-$$

$$\frac{2\sqrt{2}\,a\,d\,\sqrt{g}\,\sqrt{\text{Cos}[e+f\,x]}\,\text{EllipticPi}\left[\frac{\sqrt{-a+b}}{\sqrt{a+b}},\,\text{ArcSin}\left[\frac{\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{g}\,\sqrt{1+\text{Cos}[e+f\,x]}}\right],\,-1\right]}{b\,\sqrt{-a+b}\,\sqrt{a+b}\,f\,\sqrt{d\,\text{Cos}[e+f\,x]}}+$$

$$\frac{\sqrt{d}\,\sqrt{g}\,\text{Log}\left[\sqrt{g}-\frac{\sqrt{2}\,\sqrt{d}\,\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{d\,\text{Cos}[e+f\,x]}}+\sqrt{g}\,\text{Tan}[e+f\,x]\right]}{2\sqrt{2}\,b\,f}-\frac{\sqrt{d}\,\sqrt{g}\,\text{Log}\left[\sqrt{g}+\frac{\sqrt{2}\,\sqrt{d}\,\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{d\,\text{Cos}[e+f\,x]}}+\sqrt{g}\,\text{Tan}[e+f\,x]\right]}{2\sqrt{2}\,b\,f}$$

Result (type 4, 272 leaves) :

$$\frac{1}{\sqrt{-a-b}\,\sqrt{a-b}\,b\,f\,\sqrt{\frac{\text{Cos}[e+f\,x]}{1+\text{Cos}[e+f\,x]}}\,\sqrt{g\,\text{Sin}[e+f\,x]}}$$

$$2\sqrt{2}\,g\,\sqrt{d\,\text{Cos}[e+f\,x]}\,\left(-i\,\sqrt{-a-b}\,\sqrt{a-b}\,\text{EllipticPi}\left[-i,\,-\text{ArcSin}\left[\sqrt{\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]}\right],\,-1\right]+\right.$$

$$i\,\sqrt{-a-b}\,\sqrt{a-b}\,\text{EllipticPi}\left[i,\,-\text{ArcSin}\left[\sqrt{\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]}\right],\,-1\right]+a\left(\text{EllipticPi}\left[-\frac{\sqrt{a-b}}{\sqrt{-a-b}},\,-\text{ArcSin}\left[\sqrt{\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]}\right],\,-1\right]-\right.$$

$$\left.\left.\text{EllipticPi}\left[\frac{\sqrt{a-b}}{\sqrt{-a-b}},\,-\text{ArcSin}\left[\sqrt{\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]}\right],\,-1\right]\right)\right)\sqrt{\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]}$$

- **Problem 2: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{d\,\text{Cos}[e+f\,x]}}{(a+b\,\text{Cos}[e+f\,x])\,\sqrt{g\,\text{Sin}[e+f\,x]}}\,dx$$

Optimal (type 4, 209 leaves, 4 steps) :

$$\frac{2\sqrt{2}\sqrt{d}\,\text{EllipticPi}\left[-\frac{a}{b-\sqrt{-a^2+b^2}},\text{ArcSin}\left[\frac{\sqrt{d\,\text{Cos}[e+f\,x]}}{\sqrt{d}\sqrt{1+\text{Sin}[e+f\,x]}}\right],-1\right]\sqrt{\text{Sin}[e+f\,x]}}{\sqrt{-a^2+b^2}\,f\sqrt{g\,\text{Sin}[e+f\,x]}}-$$

$$\frac{2\sqrt{2}\sqrt{d}\,\text{EllipticPi}\left[-\frac{a}{b+\sqrt{-a^2+b^2}},\text{ArcSin}\left[\frac{\sqrt{d\,\text{Cos}[e+f\,x]}}{\sqrt{d}\sqrt{1+\text{Sin}[e+f\,x]}}\right],-1\right]\sqrt{\text{Sin}[e+f\,x]}}{\sqrt{-a^2+b^2}\,f\sqrt{g\,\text{Sin}[e+f\,x]}}$$

Result (type 6, 594 leaves) :

$$\frac{1}{f\,(a+b\,\text{Cos}[e+f\,x])\sqrt{g\,\text{Sin}[e+f\,x]}\,\left(1+\text{Tan}[e+f\,x]^2\right)^{3/2}}\,2\sqrt{d\,\text{Cos}[e+f\,x]}\,\text{Sec}[e+f\,x]^2\sqrt{\text{Tan}[e+f\,x]}$$

$$\left(b+a\sqrt{1+\text{Tan}[e+f\,x]^2}\right)\left(\frac{1}{4\sqrt{2}\,\left(a^2-b^2\right)^{3/4}}\sqrt{a}\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\sqrt{a}\sqrt{\text{Tan}[e+f\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\sqrt{a}\sqrt{\text{Tan}[e+f\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\right.\right.$$

$$\left.\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\sqrt{a}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Tan}[e+f\,x]}+a\,\text{Tan}[e+f\,x]\right]+\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\sqrt{a}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Tan}[e+f\,x]}+a\,\text{Tan}[e+f\,x]\right]\right)+$$

$$\left(5\,b\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\sqrt{\text{Tan}[e+f\,x]}\right)\Big/$$

$$\left(\sqrt{1+\text{Tan}[e+f\,x]^2}\,\left(-5\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$2\left(2\,a^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\right.$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)\right)$$

## Problem 3: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{d\,\text{Cos}[e+f\,x]}\,(a+b\,\text{Cos}[e+f\,x])}\,dx$$

Optimal (type 4, 208 leaves, 5 steps) :

$$-\frac{2\sqrt{2}\,\sqrt{g}\,\sqrt{\text{Cos}[e+f\,x]}\;\text{EllipticPi}\left[-\frac{\sqrt{-a+b}}{\sqrt{a+b}},\ \text{ArcSin}\left[\frac{\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{g}\,\sqrt{1+\text{Cos}[e+f\,x]}}\right],\ -1\right]}{\sqrt{-a+b}\,\sqrt{a+b}\;f\,\sqrt{d\,\text{Cos}[e+f\,x]}}+$$

$$\frac{2\sqrt{2}\,\sqrt{g}\,\sqrt{\text{Cos}[e+f\,x]}\;\text{EllipticPi}\left[\frac{\sqrt{-a+b}}{\sqrt{a+b}},\ \text{ArcSin}\left[\frac{\sqrt{g\,\text{Sin}[e+f\,x]}}{\sqrt{g}\,\sqrt{1+\text{Cos}[e+f\,x]}}\right],\ -1\right]}{\sqrt{-a+b}\,\sqrt{a+b}\;f\,\sqrt{d\,\text{Cos}[e+f\,x]}}$$

Result (type 6, 596 leaves) :

$$\Bigg(2\,\text{Sec}[e+f\,x]^2\,\sqrt{g\,\text{Sin}[e+f\,x]}\,\left(b+a\sqrt{1+\text{Tan}[e+f\,x]^2}\right)$$
$$\left(\frac{1}{4\sqrt{2}\,\sqrt{a}\,\left(a^2-b^2\right)^{1/4}}\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{a}\,\sqrt{\text{Tan}[e+f\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{a}\,\sqrt{\text{Tan}[e+f\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\right.\right.$$
$$\left.\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{a}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Tan}[e+f\,x]}+a\,\text{Tan}[e+f\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{a}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Tan}[e+f\,x]}+a\,\text{Tan}[e+f\,x]\right]\right)+$$
$$\left(7\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},\ \frac{1}{2},\ 1,\ \frac{7}{4},\ -\text{Tan}[e+f\,x]^2,\ -\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\text{Tan}[e+f\,x]^{3/2}\right)\Big/$$
$$\left(3\sqrt{1+\text{Tan}[e+f\,x]^2}\,\left(-7\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},\ \frac{1}{2},\ 1,\ \frac{7}{4},\ -\text{Tan}[e+f\,x]^2,\ -\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+2\,\left(2\,a^2\,\text{AppellF1}\left[\frac{7}{4},\ \frac{1}{2},\ 2,\ \frac{11}{4},\right.\right.\right.\right.$$
$$\left.-\text{Tan}[e+f\,x]^2,\ -\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{7}{4},\ \frac{3}{2},\ 1,\ \frac{11}{4},\ -\text{Tan}[e+f\,x]^2,\ -\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\Bigg)\,\text{Tan}[e+f\,x]^2\Bigg)$$
$$\left.\left.\left.\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)\right)\right)\Bigg/\left(f\,\sqrt{d\,\text{Cos}[e+f\,x]}\,\left(a+b\,\text{Cos}[e+f\,x]\right)\,\sqrt{\text{Tan}[e+f\,x]}\,\left(1+\text{Tan}[e+f\,x]^2\right)^{3/2}\right)$$

- **Problem 4: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{1}{\sqrt{d\,\text{Cos}[e+f\,x]}\,\left(a+b\,\text{Cos}[e+f\,x]\right)\,\sqrt{g\,\text{Sin}[e+f\,x]}}\,dx$$

Optimal (type 4, 273 leaves, 7 steps) :

$$-\frac{2\sqrt{2}\, b\, \text{EllipticPi}\left[-\frac{a}{b-\sqrt{-a^2+b^2}}, \text{ArcSin}\left[\frac{\sqrt{d\, \text{Cos}[e+f x]}}{\sqrt{d}\, \sqrt{1+\text{Sin}[e+f x]}}\right], -1\right] \sqrt{\text{Sin}[e+f x]}}{a \sqrt{-a^2+b^2}\, \sqrt{d}\, f \sqrt{g\, \text{Sin}[e+f x]}} +$$

$$\frac{2\sqrt{2}\, b\, \text{EllipticPi}\left[-\frac{a}{b+\sqrt{-a^2+b^2}}, \text{ArcSin}\left[\frac{\sqrt{d\, \text{Cos}[e+f x]}}{\sqrt{d}\, \sqrt{1+\text{Sin}[e+f x]}}\right], -1\right] \sqrt{\text{Sin}[e+f x]}}{a \sqrt{-a^2+b^2}\, \sqrt{d}\, f \sqrt{g\, \text{Sin}[e+f x]}} + \frac{\text{EllipticF}\left[e-\frac{\pi}{4}+f x, 2\right] \sqrt{\text{Sin}[2 e+2 f x]}}{a f \sqrt{d\, \text{Cos}[e+f x]}\, \sqrt{g\, \text{Sin}[e+f x]}}$$

Result (type 6, 5869 leaves) :

$$\left(4 (a+b) \text{Cos}\left[\frac{1}{2}(e+f x)\right]^3 \text{Sin}\left[\frac{1}{2}(e+f x)\right]\right.$$

$$\left(\left(25\, \text{AppellF1}\left[\frac{1}{4}, \frac{1}{2}, 1, \frac{5}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \Big/ \left(5 (a+b) \text{AppellF1}\left[\frac{1}{4}, \frac{1}{2}, 1, \frac{5}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left. -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] + 2 \left(-2 (a-b) \text{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 2, \frac{9}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +\right.$$

$$\left.\left.(a+b) \text{AppellF1}\left[\frac{5}{4}, \frac{3}{2}, 1, \frac{9}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right) +$$

$$\left(9\, \text{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 1, \frac{9}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right) \Big/$$

$$\left(9 (a+b) \text{AppellF1}\left[\frac{5}{4}, \frac{1}{2}, 1, \frac{9}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +\right.$$

$$2 \left(-2 (a-b) \text{AppellF1}\left[\frac{9}{4}, \frac{1}{2}, 2, \frac{13}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +\right.$$

$$\left.\left.\left.\left.(a+b) \text{AppellF1}\left[\frac{9}{4}, \frac{3}{2}, 1, \frac{13}{4}, \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\right) \Big/$$

$$\left(5 f \sqrt{\text{Cos}[e+f x]}\, \sqrt{d\, \text{Cos}[e+f x]}\, (a+b\, \text{Cos}[e+f x])^2 \sqrt{\text{Sin}[e+f x]}\, \sqrt{g\, \text{Sin}[e+f x]}\right.$$

$$\Bigg(-\frac{1}{5\,(a+b\,\text{Cos}[e+f\,x])\,\text{Sin}[e+f\,x]^{3/2}}\,2\,(a+b)\,\text{Cos}\Big[\frac{1}{2}\,(e+f\,x)\Big]^3\,\sqrt{\text{Cos}[e+f\,x]}\,\,\text{Sin}\Big[\frac{1}{2}\,(e+f\,x)\Big]$$

$$\Bigg(\Bigg(25\,\text{AppellF1}\Big[\frac{1}{4},\,\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\Bigg/\Bigg(5\,(a+b)\,\text{AppellF1}\Big[\frac{1}{4},\,\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,$$

$$-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+2\,\Bigg(-2\,(a-b)\,\text{AppellF1}\Big[\frac{5}{4},\,\frac{1}{2},\,2,\,\frac{9}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$(a+b)\,\text{AppellF1}\Big[\frac{5}{4},\,\frac{3}{2},\,1,\,\frac{9}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)+$$

$$\Bigg(9\,\text{AppellF1}\Big[\frac{5}{4},\,\frac{1}{2},\,1,\,\frac{9}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)\Bigg/$$

$$\Bigg(9\,(a+b)\,\text{AppellF1}\Big[\frac{5}{4},\,\frac{1}{2},\,1,\,\frac{9}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg(-2\,(a-b)\,\text{AppellF1}\Big[\frac{9}{4},\,\frac{1}{2},\,2,\,\frac{13}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+(a+b)\,\text{AppellF1}\Big[\frac{9}{4},\,\frac{3}{2},\,1,\,\frac{13}{4},$$

$$\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)\Bigg)+\frac{1}{5\,\sqrt{\text{Cos}[e+f\,x]}\,\,(a+b\,\text{Cos}[e+f\,x])\,\sqrt{\text{Sin}[e+f\,x]}}$$

$$2\,(a+b)\,\text{Cos}\Big[\frac{1}{2}\,(e+f\,x)\Big]^4\,\Bigg(\Bigg(25\,\text{AppellF1}\Big[\frac{1}{4},\,\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\Bigg/$$

$$\Bigg(5\,(a+b)\,\text{AppellF1}\Big[\frac{1}{4},\,\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg(-2\,(a-b)\,\text{AppellF1}\Big[\frac{5}{4},\,\frac{1}{2},\,2,\,\frac{9}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+(a+b)$$

$$\text{AppellF1}\Big[\frac{5}{4},\,\frac{3}{2},\,1,\,\frac{9}{4},\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)+$$

$$\left(9\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\Big/$$

$$\left(9\,(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2\,(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)-$$

$$\frac{1}{5\sqrt{\text{Cos}[e+f x]}\,(a+b\,\text{Cos}[e+f x])\,\sqrt{\text{Sin}[e+f x]}}\,6\,(a+b)\,\text{Cos}\left[\frac{1}{2}(e+f x)\right]^2\text{Sin}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left(\left(25\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\Big/\right.$$

$$\left(5\,(a+b)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2\,(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(9\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\Big/$$

$$\left(9\,(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2\,(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)+$$

$$\frac{1}{5\sqrt{\text{Cos}[e+f x]}\,(a+b\,\text{Cos}[e+f x])^2}4\,b\,(a+b)\,\text{Cos}\left[\frac{1}{2}(e+f x)\right]^3\text{Sin}\left[\frac{1}{2}(e+f x)\right]\sqrt{\text{Sin}[e+f x]}$$

$$\Bigg(\Bigg(25\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\Bigg/$$

$$\Bigg(5\,(a+b)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg(-2\,(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+(a+b)$$

$$\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg/$$

$$\Bigg(9\,(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg(-2\,(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+(a+b)$$

$$\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg)+$$

$$\frac{1}{5\,\text{Cos}[e+f x]^{3/2}\,(a+b\,\text{Cos}[e+f x])}2\,(a+b)\,\text{Cos}\left[\frac{1}{2}(e+f x)\right]^3\text{Sin}\left[\frac{1}{2}(e+f x)\right]\sqrt{\text{Sin}[e+f x]}$$

$$\Bigg(\Bigg(25\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\Bigg/$$

$$\Bigg(5\,(a+b)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\left(-2(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\left.\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)+$$

$$\left(9\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\Big/$$

$$\left(9(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\Bigg)+$$

$$\frac{1}{5\sqrt{\text{Cos}[e+fx]}\,(a+b\,\text{Cos}[e+fx])\sqrt{\text{Sin}[e+fx]}}\,4(a+b)\,\text{Cos}\left[\frac{1}{2}(e+fx)\right]^3\text{Sin}\left[\frac{1}{2}(e+fx)\right]$$

$$\Bigg(\Bigg(25\left(-1/(5(a+b))(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\right.$$

$$\left.\frac{1}{10}\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\Bigg)\Big/$$

$$\left(5(a+b)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\left.\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)+$$

$$\left(9\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\Big/$$

$$\left(9\,(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2\,(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+(a+b)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)+$$

$$\left(9\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\left(-1/(9\,(a+b))\,5\,(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\frac{5}{18}\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\right)\Big/\left(9\,(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left(-2\,(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+(a+b)\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\right.\right.$$

$$\left.\left.\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)-\left(25\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\right.\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\left(2\left(-2\,(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.\right.$$

$$\left.(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+5\,(a+b)$$

$$\left(-\frac{1}{5\,(a+b)}(a-b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\right.$$

$$\frac{1}{10}\,\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg(-2(a-b)\Bigg(-\frac{1}{9(a+b)}10(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},3,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{5}{18}\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},2,\frac{13}{4},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+(a+b)\Bigg(-\frac{1}{9(a+b)}$$

$$5(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$\frac{5}{6}\,\text{AppellF1}\left[\frac{9}{4},\frac{5}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(5(a+b)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\Bigg(-2(a-b)\,\text{AppellF1}\Big[$$

$$\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]+$$

$$(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2-$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\Bigg(2\Bigg(-2(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$(a+b)\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+9(a+b)$$

$$\Bigg(-\frac{1}{9(a+b)}5(a-b)\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$\frac{5}{18}\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg(-2(a-b)\Bigg(-\frac{1}{13(a+b)}18(a-b)\,\text{AppellF1}\left[\frac{13}{4},\frac{1}{2},3,\frac{17}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{9}{26}\,\text{AppellF1}\left[\frac{13}{4},\frac{3}{2},2,\frac{17}{4},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+(a+b)\Bigg(-\frac{1}{13(a+b)}$$

$$9(a-b)\,\text{AppellF1}\left[\frac{13}{4},\frac{3}{2},2,\frac{17}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$\frac{27}{26}\,\text{AppellF1}\left[\frac{13}{4},\frac{5}{2},1,\frac{17}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(9(a+b)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\Bigg(-2(a-b)\,\text{AppellF1}\Bigg[$$

$$\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]+$$

$$(a+b)\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2\Bigg)\Bigg)\Bigg)$$

# Test results for the 1 problems in "4.2.2.3 (g cos)^p (a+b cos)^m (c+d cos)^n.m"

- **Problem 1: Result more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[e+f x])^2\,\text{Sec}[e+f x]^2}{-c+c\,\text{Cos}[e+f x]}\,dx$$

Optimal (type 3, 65 leaves, 6 steps):

$$-\frac{3\,a^2\,\text{ArcTanh}[\text{Sin}[e+f x]]}{c\,f}+\frac{4\,a^2\,\text{Sin}[e+f x]}{c\,f\,(1-\text{Cos}[e+f x])}-\frac{a^2\,\text{Tan}[e+f x]}{c\,f}$$

Result (type 3, 194 leaves):

$$\frac{1}{c\,f\,(-1+\text{Cos}[e+f\,x])}2\,a^2\,\text{Sin}\left[\frac{1}{2}\,(e+f\,x)\right]$$
$$\left(4\,\text{Csc}\left[\frac{e}{2}\right]\,\text{Sin}\left[\frac{f\,x}{2}\right]+\text{Sin}\left[\frac{1}{2}\,(e+f\,x)\right]\,\left(-3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(e+f\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(e+f\,x)\right]\right]+3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(e+f\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(e+f\,x)\right]\right]+\right.\right.$$
$$\left.\left.\text{Sin}[f\,x]\Big/\left(\left(\text{Cos}\left[\frac{e}{2}\right]-\text{Sin}\left[\frac{e}{2}\right]\right)\left(\text{Cos}\left[\frac{e}{2}\right]+\text{Sin}\left[\frac{e}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(e+f\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(e+f\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\right)\right)\right)$$

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# Test results for the 644 problems in "4.2.3.1 (a+b cos)^m (c+d cos)^n (A+B cos).m"

- **Problem 5: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 32 leaves, 4 steps):

$$a\,(A+B)\,x+\frac{a\,A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{a\,B\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 104 leaves):

$$a\,A\,x+a\,B\,x-\frac{a\,A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,B\,\text{Cos}[d\,x]\,\text{Sin}[c]}{d}+\frac{a\,B\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}$$

- **Problem 6: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 32 leaves, 4 steps):

$$a\,B\,x+\frac{a\,(A+B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{a\,A\,\text{Tan}[c+d\,x]}{d}$$

Result (type 3, 159 leaves):

$$a\,B\,x-\frac{a\,A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}-\frac{a\,B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+$$
$$\frac{a\,A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,A\,\text{Tan}[c+d\,x]}{d}$$

- **Problem 7: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 56 leaves, 6 steps):

$$\frac{a\,(A+2B)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}+\frac{a\,(A+B)\,\text{Tan}[c+d x]}{d}+\frac{a\,A\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{2 d}$$

Result (type 3, 154 leaves) :

$$\frac{1}{4 d}a\left(-2\,(A+2B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]+2\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]+4\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]+\frac{A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^2}-\frac{A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^2}+4\,(A+B)\,\text{Tan}[c+d x]\right)$$

- **Problem 9: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d x])\,(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^5\,dx$$

Optimal (type 3, 106 leaves, 7 steps) :

$$\frac{a\,(3A+4B)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{a\,(A+B)\,\text{Tan}[c+d x]}{d}+\frac{a\,(3A+4B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{8 d}+\frac{a\,A\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]}{4 d}+\frac{a\,(A+B)\,\text{Tan}[c+d x]^3}{3 d}$$

Result (type 3, 403 leaves) :

$$-\frac{3\,a\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]}{8 d}-\frac{a\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]}{2 d}+\frac{3\,a\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]}{8 d}+\frac{a\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right]}{2 d}+\frac{a\,A}{16 d\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^4}+\frac{3\,a\,A}{16 d\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^2}+\frac{a\,B}{4 d\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^2}-\frac{a\,A}{16 d\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^4}-\frac{3\,a\,A}{16 d\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^2}-\frac{a\,B}{4 d\left(\text{Cos}\left[\frac{1}{2}\,(c+d x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]\right)^2}+\frac{2\,a\,A\,\text{Tan}[c+d x]}{3 d}+\frac{2\,a\,B\,\text{Tan}[c+d x]}{3 d}+\frac{a\,A\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3 d}+\frac{a\,B\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3 d}$$

- **Problem 16: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d x])^2\,(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^3\,dx$$

Optimal (type 3, 88 leaves, 5 steps) :

$$a^2 B x + \frac{a^2 (3 A + 4 B) \text{ArcTanh}[\text{Sin}[c + d x]]}{2 d} + \frac{a^2 (3 A + 2 B) \text{Tan}[c + d x]}{2 d} + \frac{A \left(a^2 + a^2 \text{Cos}[c + d x]\right) \text{Sec}[c + d x] \text{Tan}[c + d x]}{2 d}$$

Result (type 3, 277 leaves):

$$\frac{1}{16} a^2 (1 + \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{1}{2} (c + d x)\right]^4$$
$$\left(4 B x - \frac{2 (3 A + 4 B) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{d} + \frac{2 (3 A + 4 B) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{d} + \right.$$
$$\frac{A}{d \left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{4 (2 A + B) \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right] - \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)} -$$
$$\left.\frac{A}{d \left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{4 (2 A + B) \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right] + \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)}\right)$$

- **Problem 17: Result more than twice size of optimal antiderivative.**

$$\int (a + a \text{Cos}[c + d x])^2 (A + B \text{Cos}[c + d x]) \text{Sec}[c + d x]^4 \, dx$$

Optimal (type 3, 113 leaves, 7 steps):

$$\frac{a^2 (2 A + 3 B) \text{ArcTanh}[\text{Sin}[c + d x]]}{2 d} + \frac{a^2 (5 A + 6 B) \text{Tan}[c + d x]}{3 d} +$$
$$\frac{a^2 (4 A + 3 B) \text{Sec}[c + d x] \text{Tan}[c + d x]}{6 d} + \frac{A \left(a^2 + a^2 \text{Cos}[c + d x]\right) \text{Sec}[c + d x]^2 \text{Tan}[c + d x]}{3 d}$$

Result (type 3, 753 leaves):

$$\frac{(-2A-3B)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{8\,d}+$$

$$\frac{(2A+3B)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{8\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(7A\,\mathrm{Cos}\left[\frac{c}{2}\right]+3B\,\mathrm{Cos}\left[\frac{c}{2}\right]-5A\,\mathrm{Sin}\left[\frac{c}{2}\right]-3B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{48\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(5A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+6B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{12\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{24\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(-7A\,\mathrm{Cos}\left[\frac{c}{2}\right]-3B\,\mathrm{Cos}\left[\frac{c}{2}\right]-5A\,\mathrm{Sin}\left[\frac{c}{2}\right]-3B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{48\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(5A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+6B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{12\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

## Problem 23: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^3\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 110 leaves, 6 steps):

$$\frac{1}{2}a^3\,(6A+7B)\,x+\frac{a^3\,(3A+B)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}+\frac{5\,a^3\,B\,\mathrm{Sin}[c+d\,x]}{2\,d}-\frac{(2A-B)\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Sin}[c+d\,x]}{2\,d}+\frac{a\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 272 leaves):

$$\frac{1}{32}a^3\,(1+\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^6$$

$$\left(2\,(6A+7B)\,x-\frac{4\,(3A+B)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{d}+\frac{4\,(3A+B)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{d}+\right.$$

$$\frac{4\,(A+3B)\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{d}+\frac{B\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{d}+\frac{4\,(A+3B)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}+\frac{B\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{d}+$$

$$\left.\frac{4\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{4\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right)$$

## Problem 25: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 125 leaves, 6 steps):

$$a^3\,B\,x+\frac{a^3\,(5\,A+7\,B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{5\,a^3\,(A+B)\,\text{Tan}[c+d\,x]}{2\,d}+\frac{(5\,A+3\,B)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{6\,d}+\frac{a\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 786 leaves):

$$\frac{1}{8}\,B\,x\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+\frac{(-5\,A-7\,B)\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{16\,d}+$$
$$\frac{(5\,A+7\,B)\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{16\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sin}\left[\frac{d\,x}{2}\right]}{48\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$
$$\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(10\,A\,\text{Cos}\left[\frac{c}{2}\right]+3\,B\,\text{Cos}\left[\frac{c}{2}\right]-8\,A\,\text{Sin}\left[\frac{c}{2}\right]-3\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{96\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$
$$\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(11\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+9\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sin}\left[\frac{d\,x}{2}\right]}{48\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$
$$\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(-10\,A\,\text{Cos}\left[\frac{c}{2}\right]-3\,B\,\text{Cos}\left[\frac{c}{2}\right]-8\,A\,\text{Sin}\left[\frac{c}{2}\right]-3\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{96\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$
$$\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(11\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+9\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

## Problem 32: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\text{Cos}[c+d\,x])^4\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 150 leaves, 7 steps):

$$\frac{1}{2}\,a^4\,(13\,A+12\,B)\,x+\frac{a^4\,(4\,A+B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{5\,a^4\,(A+2\,B)\,\text{Sin}[c+d\,x]}{2\,d}-\frac{(3\,A-B)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{3\,d}-\frac{(3\,A-8\,B)\,\left(a^4+a^4\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{6\,d}+\frac{a\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Tan}[c+d\,x]}{d}$$

Result (type 3, 312 leaves):

$$\frac{1}{192} a^4 (1+\text{Cos}[c+d x])^4 \text{Sec}\left[\frac{1}{2} (c+d x)\right]^8 \left(78 A x + 72 B x - \frac{12 (4 A+B) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d} + \frac{12 (4 A+B) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d} + \frac{3 (16 A+27 B) \text{Cos}[d x] \text{Sin}[c]}{d} + \frac{3 (A+4 B) \text{Cos}[2 d x] \text{Sin}[2 c]}{d} + \frac{B \text{Cos}[3 d x] \text{Sin}[3 c]}{d} + \frac{3 (16 A+27 B) \text{Cos}[c] \text{Sin}[d x]}{d} + \frac{3 (A+4 B) \text{Cos}[2 c] \text{Sin}[2 d x]}{d} + \frac{B \text{Cos}[3 c] \text{Sin}[3 d x]}{d} + \frac{12 A \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)} + \frac{12 A \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}\right)$$

## Problem 33: Result more than twice size of optimal antiderivative.

$$\int (a+a \text{Cos}[c+d x])^4 (A+B \text{Cos}[c+d x]) \text{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 162 leaves, 7 steps):

$$\frac{1}{2} a^4 (8 A+13 B) x + \frac{a^4 (13 A+8 B) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d} - \frac{5 a^4 (A-B) \text{Sin}[c+d x]}{2 d} - \frac{(6 A+B) \left(a^4+a^4 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{2 d} + \frac{(5 A+2 B) \left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Tan}[c+d x]}{2 d} + \frac{a A (a+a \text{Cos}[c+d x])^3 \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 d}$$

Result (type 3, 688 leaves):

$$\frac{1}{32} (8 A+13 B) x (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 + \frac{(-13 A-8 B) (a+a \text{Cos}[c+d x])^4 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d} + \frac{(13 A+8 B) (a+a \text{Cos}[c+d x])^4 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d} + \frac{(A+4 B) \text{Cos}[d x] (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \text{Sin}[c]}{16 d} + \frac{B \text{Cos}[2 d x] (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \text{Sin}[2 c]}{64 d} + \frac{(A+4 B) \text{Cos}[c] (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \text{Sin}[d x]}{16 d} + \frac{B \text{Cos}[2 c] (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \text{Sin}[2 d x]}{64 d} + \frac{A (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{64 d \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2} + \frac{(a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \left(4 A \text{Sin}\left[\frac{d x}{2}\right]+B \text{Sin}\left[\frac{d x}{2}\right]\right)}{16 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)} - \frac{A (a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{64 d \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2} + \frac{(a+a \text{Cos}[c+d x])^4 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \left(4 A \text{Sin}\left[\frac{d x}{2}\right]+B \text{Sin}\left[\frac{d x}{2}\right]\right)}{16 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

## Problem 34: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^4\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 165 leaves, 7 steps):

$$a^4\,(A+4\,B)\,x+\frac{a^4\,(12\,A+13\,B)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,d}-\frac{5\,a^4\,(2\,A+B)\,\mathrm{Sin}[c+d\,x]}{2\,d}+\frac{(11\,A+9\,B)\,\left(a^4+a^4\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Tan}[c+d\,x]}{3\,d}+$$
$$\frac{(2\,A+B)\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}+\frac{a\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 380 leaves):

$$a^4\left(\frac{(A+4\,B)\,(c+d\,x)}{d}+\frac{(-12\,A-13\,B)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\right.$$
$$\frac{(12\,A+13\,B)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\frac{13\,A+3\,B}{12\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{-13\,A-3\,B}{12\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\left.\frac{4\,\left(5\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{4\,\left(5\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{B\,\mathrm{Sin}[c+d\,x]}{d}\right)$$

## Problem 38: Result more than twice size of optimal antiderivative.

$$\int \frac{\mathrm{Cos}[c+d\,x]^4\,(A+B\,\mathrm{Cos}[c+d\,x])}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 153 leaves, 7 steps):

$$-\frac{3\,(4\,A-5\,B)\,x}{8\,a}+\frac{4\,(A-B)\,\mathrm{Sin}[c+d\,x]}{a\,d}-\frac{3\,(4\,A-5\,B)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{8\,a\,d}-$$
$$\frac{(4\,A-5\,B)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{4\,a\,d}+\frac{(A-B)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}-\frac{4\,(A-B)\,\mathrm{Sin}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 311 leaves):

$$\frac{1}{192\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(-72\,(4\,A-5\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-72\,(4\,A-5\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+552\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-552\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+168\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-168\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+144\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-120\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+144\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-120\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-16\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+40\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-16\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+40\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+8\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-5\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+8\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-5\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+3\,B\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+3\,B\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 39: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^3\,(A+B\,\text{Cos}[c+d\,x])}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 122 leaves, 6 steps):

$$\frac{3\,(A-B)\,x}{2\,a}-\frac{(3\,A-4\,B)\,\text{Sin}[c+d\,x]}{a\,d}+\frac{3\,(A-B)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a\,d}+\frac{(A-B)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}+\frac{(3\,A-4\,B)\,\text{Sin}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 249 leaves):

$$\frac{1}{24\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(36\,(A-B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+36\,(A-B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-60\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+69\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-12\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+21\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-9\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+18\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+18\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+3\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+3\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-2\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 40: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^2\,(A+B\,\text{Cos}[c+d\,x])}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 90 leaves, 2 steps):

$$-\frac{(A-B)\,x}{a}+\frac{B\,x}{2\,a}+\frac{(A-B)\,\text{Sin}[c+d\,x]}{a\,d}+\frac{B\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a\,d}+\frac{(A-B)\,\text{Sin}[c+d\,x]}{a\,d\,(1+\text{Cos}[c+d\,x])}$$

Result (type 3, 197 leaves):

$$\frac{1}{8\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(-4\,(2\,A-3\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-4\,(2\,A-3\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+20\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-20\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+4\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-4\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+4\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-3\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+4\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-3\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]\right)$$

## Problem 41: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Cos}[c+d\,x]\,(A+B\,\text{Cos}[c+d\,x])}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 54 leaves, 5 steps):

$$\frac{(A-B)\,x}{a}+\frac{B\,\text{Sin}[c+d\,x]}{a\,d}-\frac{(A-B)\,\text{Sin}[c+d\,x]}{a\,d\,(1+\text{Cos}[c+d\,x])}$$

Result (type 3, 126 leaves):

$$\frac{1}{2\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(2\,(A-B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+2\,(A-B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-4\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+5\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]\right)$$

## Problem 42: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 34 leaves, 2 steps):

$$\frac{B\,x}{a}+\frac{(A-B)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 3, 72 leaves):

$$\frac{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(B\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+B\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+2\,(A-B)\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{a\,d\,(1+\text{Cos}[c+d\,x])}$$

## Problem 43: Result more than twice size of optimal antiderivative.

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 44 leaves, 3 steps):

$$\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a\,d}-\frac{(A-B)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 3, 109 leaves):

$$\frac{1}{a\,d\,(1+\text{Cos}[c+d\,x])}2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(A\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+(-A+B)\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)$$

- **Problem 44: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 69 leaves, 5 steps):

$$-\frac{(A-B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a\,d}+\frac{(2\,A-B)\,\text{Tan}[c+d\,x]}{a\,d}-\frac{(A-B)\,\text{Tan}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 3, 201 leaves):

$$\frac{1}{a\,d\,(1+\text{Cos}[c+d\,x])}2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left((A-B)\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left((A-B)\left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+(A\,\text{Sin}[d\,x])\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\right)\right)$$

- **Problem 45: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 107 leaves, 6 steps):

$$\frac{(3\,A-2\,B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a\,d}-\frac{2\,(A-B)\,\text{Tan}[c+d\,x]}{a\,d}+\frac{(3\,A-2\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a\,d}-\frac{(A-B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 3, 289 leaves):

$$\frac{1}{2\,a\,d\,(1+\text{Cos}[c+d\,x])}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(4\,(-A+B)\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+\right.$$
$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left((-6\,A+4\,B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+6\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\right.$$
$$4\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-(4\,(A-B)$$
$$\left.\left.\text{Sin}[d\,x])\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\right)\right)$$

## Problem 46: Result more than twice size of optimal antiderivative.

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^4}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 131 leaves, 6 steps):

$$-\frac{3\,(A-B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a\,d}+\frac{(4\,A-3\,B)\,\text{Tan}[c+d\,x]}{a\,d}-$$
$$\frac{3\,(A-B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a\,d}-\frac{(A-B)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}+\frac{(4\,A-3\,B)\,\text{Tan}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 569 leaves):

$$\frac{3\,(A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])}-$$
$$\frac{3\,(A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])}+\frac{1}{48\,d\,(a+a\,\text{Cos}[c+d\,x])}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3$$
$$\left(6\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+6\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+39\,A\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-27\,B\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-24\,A\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+12\,B\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-6\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+\right.$$
$$6\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-24\,A\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+24\,B\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+21\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+9\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$
$$9\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-9\,A\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+9\,B\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+7\,A\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-3\,B\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$3\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-3\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-9\,A\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+9\,B\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+16\,A\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$
$$\left.12\,B\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+10\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-6\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+6\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-6\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 47: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d x]^4 (A+B \text{Cos}[c+d x])}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 170 leaves, 7 steps):

$$\frac{(7 A-10 B) x}{2 a^2}-\frac{4 (2 A-3 B) \text{Sin}[c+d x]}{a^2 d}+\frac{(7 A-10 B) \text{Cos}[c+d x] \text{Sin}[c+d x]}{2 a^2 d}+\frac{(7 A-10 B) \text{Cos}[c+d x]^3 \text{Sin}[c+d x]}{3 a^2 d (1+\text{Cos}[c+d x])}+\frac{(A-B) \text{Cos}[c+d x]^4 \text{Sin}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}+\frac{4 (2 A-3 B) \text{Sin}[c+d x]^3}{3 a^2 d}$$

Result (type 3, 369 leaves):

$$\frac{1}{48 a^2 d (1+\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Sec}\left[\frac{c}{2}\right] \left(36 (7 A-10 B) d x \text{Cos}\left[\frac{d x}{2}\right]+36 (7 A-10 B) d x \text{Cos}\left[c+\frac{d x}{2}\right]+84 A d x \text{Cos}\left[c+\frac{3 d x}{2}\right]-120 B d x \text{Cos}\left[c+\frac{3 d x}{2}\right]+84 A d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]-120 B d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]-381 A \text{Sin}\left[\frac{d x}{2}\right]+516 B \text{Sin}\left[\frac{d x}{2}\right]+147 A \text{Sin}\left[c+\frac{d x}{2}\right]-156 B \text{Sin}\left[c+\frac{d x}{2}\right]-239 A \text{Sin}\left[c+\frac{3 d x}{2}\right]+342 B \text{Sin}\left[c+\frac{3 d x}{2}\right]-63 A \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+118 B \text{Sin}\left[2 c+\frac{3 d x}{2}\right]-15 A \text{Sin}\left[2 c+\frac{5 d x}{2}\right]+30 B \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-15 A \text{Sin}\left[3 c+\frac{5 d x}{2}\right]+30 B \text{Sin}\left[3 c+\frac{5 d x}{2}\right]+3 A \text{Sin}\left[3 c+\frac{7 d x}{2}\right]-3 B \text{Sin}\left[3 c+\frac{7 d x}{2}\right]+3 A \text{Sin}\left[4 c+\frac{7 d x}{2}\right]-3 B \text{Sin}\left[4 c+\frac{7 d x}{2}\right]+B \text{Sin}\left[4 c+\frac{9 d x}{2}\right]+B \text{Sin}\left[5 c+\frac{9 d x}{2}\right]\right)$$

- **Problem 48: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d x]^3 (A+B \text{Cos}[c+d x])}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 147 leaves, 3 steps):

$$-\frac{(4 A-7 B) x}{2 a^2}+\frac{2 (5 A-8 B) \text{Sin}[c+d x]}{3 a^2 d}-\frac{(4 A-7 B) \text{Cos}[c+d x] \text{Sin}[c+d x]}{2 a^2 d}+\frac{(5 A-8 B) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{3 a^2 d (1+\text{Cos}[c+d x])}+\frac{(A-B) \text{Cos}[c+d x]^3 \text{Sin}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 315 leaves):

$$\frac{1}{48\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(-36\,(4\,A-7\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-36\,(4\,A-7\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-48\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+84\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-48\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+84\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+264\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-381\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-120\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+147\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+164\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-239\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+36\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-63\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+12\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-15\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+12\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-15\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 50: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 70 leaves, 4 steps):

$$\frac{B\,x}{a^2}+\frac{(2\,A-5\,B)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 153 leaves):

$$\frac{1}{24\,a^2\,d}\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\left(9\,B\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+9\,B\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+3\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+3\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+6\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-18\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-6\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+12\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+4\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-10\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 52: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 79 leaves, 4 steps):

$$\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}-\frac{(4\,A-B)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 170 leaves):

$$-\frac{1}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}2\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(6\,A\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+(A-B)\,\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+2\,(4\,A-B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+(A-B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Tan}\left[\frac{c}{2}\right]\right)$$

## Problem 53: Result more than twice size of optimal antiderivative.

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^2}{(a + a \operatorname{Cos}[c + d x])^2} \, dx$$

Optimal (type 3, 107 leaves, 6 steps):

$$-\frac{(2 A - B) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{a^2 d} + \frac{2 (5 A - 2 B) \operatorname{Tan}[c + d x]}{3 a^2 d} - \frac{(2 A - B) \operatorname{Tan}[c + d x]}{a^2 d (1 + \operatorname{Cos}[c + d x])} - \frac{(A - B) \operatorname{Tan}[c + d x]}{3 d (a + a \operatorname{Cos}[c + d x])^2}$$

Result (type 3, 264 leaves):

$$\frac{1}{3 a^2 d (1 + \operatorname{Cos}[c + d x])^2} 2 \operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] \left((A - B) \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right] + 2 (7 A - 4 B) \operatorname{Cos}\left[\frac{1}{2} (c + d x)\right]^2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right] + 6 \operatorname{Cos}\left[\frac{1}{2} (c + d x)\right]^3 \left((2 A - B) \left(\operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] - \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]\right) + (A \operatorname{Sin}[d x]) \Big/ \left(\left(\operatorname{Cos}\left[\frac{c}{2}\right] - \operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{c}{2}\right] + \operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right) \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)\right)\right) + (A - B) \operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] \operatorname{Tan}\left[\frac{c}{2}\right]\right)$$

## Problem 54: Result more than twice size of optimal antiderivative.

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^3}{(a + a \operatorname{Cos}[c + d x])^2} \, dx$$

Optimal (type 3, 152 leaves, 7 steps):

$$\frac{(7 A - 4 B) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 a^2 d} - \frac{2 (8 A - 5 B) \operatorname{Tan}[c + d x]}{3 a^2 d} + \frac{(7 A - 4 B) \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 a^2 d} - \frac{(8 A - 5 B) \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{3 a^2 d (1 + \operatorname{Cos}[c + d x])} - \frac{(A - B) \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{3 d (a + a \operatorname{Cos}[c + d x])^2}$$

Result (type 3, 574 leaves):

$$-\frac{2\,(7\,A-4\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}+$$

$$\frac{2\,(7\,A-4\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{48\,d\,(a+a\,\text{Cos}[c+d\,x])^2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2$$

$$\left(14\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-14\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-97\,A\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+64\,B\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+126\,A\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-84\,B\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-42\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+\right.$$

$$42\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+98\,A\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-56\,B\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+3\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-6\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-37\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$

$$34\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+63\,A\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-36\,B\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-75\,A\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+48\,B\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-15\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$

$$6\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-39\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+30\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+21\,A\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-12\,B\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-$$

$$\left.32\,A\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+20\,B\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-12\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+6\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-20\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+14\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 55: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^4}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 179 leaves, 7 steps):

$$-\frac{(10\,A-7\,B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^2\,d}+\frac{4\,(3\,A-2\,B)\,\text{Tan}[c+d\,x]}{a^2\,d}-\frac{(10\,A-7\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^2\,d}-$$

$$\frac{(10\,A-7\,B)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{4\,(3\,A-2\,B)\,\text{Tan}[c+d\,x]^3}{3\,a^2\,d}$$

Result (type 3, 686 leaves):

$$\frac{2\,(10\,A-7\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-$$

$$\frac{2\,(10\,A-7\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{1}{96\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,\Bigg(-6\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+45\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+310\,A\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-201\,B\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-306\,A\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]+$$

$$195\,B\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]+42\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-51\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-270\,A\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+189\,B\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+50\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$

$$B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+90\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-81\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-170\,A\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+119\,B\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+198\,A\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]-$$

$$129\,B\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+42\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-9\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+66\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-57\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-90\,A\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+$$

$$63\,B\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+114\,A\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-75\,B\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+36\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-15\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+$$

$$48\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-39\,B\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-30\,A\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+21\,B\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+48\,A\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-$$

$$32\,B\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+22\,A\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-12\,B\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+26\,A\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-20\,B\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\Bigg)$$

- **Problem 56: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^5\,(A+B\,\mathrm{Cos}[c+d\,x])}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 218 leaves, 8 steps):

$$\frac{(13\,A-23\,B)\,x}{2\,a^3}-\frac{4\,(19\,A-34\,B)\,\mathrm{Sin}[c+d\,x]}{5\,a^3\,d}+\frac{(13\,A-23\,B)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a^3\,d}+\frac{(A-B)\,\mathrm{Cos}[c+d\,x]^5\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{(8\,A-13\,B)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{(13\,A-23\,B)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{3\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}+\frac{4\,(19\,A-34\,B)\,\mathrm{Sin}[c+d\,x]^3}{15\,a^3\,d}$$

Result (type 3, 491 leaves):

$$\frac{1}{480\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(600\,(13\,A-23\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+600\,(13\,A-23\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+3900\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-6900\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+3900\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-6900\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+780\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-1380\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+780\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-1380\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-12\,760\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+20\,410\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+7560\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-11\,110\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-9230\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+15\,380\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+930\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-380\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-2782\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+4777\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-750\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+1625\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-105\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+230\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-105\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+230\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,A\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-20\,B\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+15\,A\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-20\,B\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+5\,B\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+5\,B\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 57: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^4\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 193 leaves, 4 steps):

$$-\frac{(6\,A-13\,B)\,x}{2\,a^3}+\frac{8\,(9\,A-19\,B)\,\text{Sin}[c+d\,x]}{15\,a^3\,d}-\frac{(6\,A-13\,B)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a^3\,d}+\frac{(A-B)\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{(6\,A-11\,B)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{4\,(9\,A-19\,B)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{15\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 435 leaves):

$$\frac{1}{480\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(-600\,(6\,A-13\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-600\,(6\,A-13\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-1800\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+3900\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-1800\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+3900\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-360\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+780\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-360\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+780\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+7020\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-12\,760\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-4500\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+7560\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+4860\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9230\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-900\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+930\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+1452\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2782\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+300\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-750\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+60\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-105\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+60\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-105\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,B\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+15\,B\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 58: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^3\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 147 leaves, 7 steps):

$$\frac{(A-3\,B)\,x}{a^3}-\frac{(7\,A-27\,B)\,\text{Sin}[c+d\,x]}{15\,a^3\,d}+\frac{(A-B)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{(4\,A-9\,B)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(A-3\,B)\,\text{Sin}[c+d\,x]}{d\,(a^3+a^3\,\text{Cos}[c+d\,x])}$$

Result (type 3, 361 leaves):

$$\frac{1}{120\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(300\,(A-3\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+300\,(A-3\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+150\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-450\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+150\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-450\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+30\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-90\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+30\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-90\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-740\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+1755\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+540\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-1125\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-460\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+1215\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+180\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-225\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-128\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+363\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+75\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+15\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+15\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

## Problem 59: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]^2 (A+B \text{Cos}[c+d x])}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 116 leaves, 5 steps):

$$\frac{B x}{a^3}+\frac{(A-B) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{(2 A-7 B) \text{Sin}[c+d x]}{15 a d (a+a \text{Cos}[c+d x])^2}+\frac{(4 A-29 B) \text{Sin}[c+d x]}{15 d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 241 leaves):

$$\frac{1}{480 a^3 d} \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{1}{2} (c+d x)\right]^5 \left(150 B d x \text{Cos}\left[\frac{d x}{2}\right]+150 B d x \text{Cos}\left[c+\frac{d x}{2}\right]+75 B d x \text{Cos}\left[c+\frac{3 d x}{2}\right]+75 B d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]+15 B d x \text{Cos}\left[2 c+\frac{5 d x}{2}\right]+15 B d x \text{Cos}\left[3 c+\frac{5 d x}{2}\right]+80 A \text{Sin}\left[\frac{d x}{2}\right]-370 B \text{Sin}\left[\frac{d x}{2}\right]-60 A \text{Sin}\left[c+\frac{d x}{2}\right]+270 B \text{Sin}\left[c+\frac{d x}{2}\right]+40 A \text{Sin}\left[c+\frac{3 d x}{2}\right]-230 B \text{Sin}\left[c+\frac{3 d x}{2}\right]-30 A \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+90 B \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+14 A \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-64 B \text{Sin}\left[2 c+\frac{5 d x}{2}\right]\right)$$

## Problem 63: Result more than twice size of optimal antiderivative.

$$\int \frac{(A+B \text{Cos}[c+d x]) \text{Sec}[c+d x]^2}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 145 leaves, 7 steps):

$$-\frac{(3 A-B) \text{ArcTanh}[\text{Sin}[c+d x]]}{a^3 d}+\frac{2 (36 A-11 B) \text{Tan}[c+d x]}{15 a^3 d}-\frac{(A-B) \text{Tan}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{(9 A-4 B) \text{Tan}[c+d x]}{15 a d (a+a \text{Cos}[c+d x])^2}-\frac{(3 A-B) \text{Tan}[c+d x]}{d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 482 leaves):

$$\frac{1}{120\, a^3\, d\, (1+\text{Cos}[c+d\,x])^3}\left(960\,(3\,A-B)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^6\left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{c}{2}\right]\right.$$
$$\text{Sec}[c]\,\text{Sec}[c+d\,x]\left(-5\,(51\,A-32\,B)\,\text{Sin}\left[\frac{d\,x}{2}\right]+(567\,A-167\,B)\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-600\,A\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+170\,B\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+375\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-\right.$$
$$170\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-480\,A\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+160\,B\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-60\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+75\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+402\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$
$$167\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-225\,A\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+75\,B\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+315\,A\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-95\,B\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+30\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$15\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+240\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-95\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-45\,A\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+15\,B\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+$$
$$\left.\left.72\,A\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-22\,B\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+15\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+57\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-22\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)\right)$$

- **Problem 64: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 196 leaves, 8 steps) :

$$\frac{(13\,A-6\,B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^3\,d}-\frac{8\,(19\,A-9\,B)\,\text{Tan}[c+d\,x]}{15\,a^3\,d}+\frac{(13\,A-6\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^3\,d}-$$
$$\frac{(A-B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(11\,A-6\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{4\,(19\,A-9\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{15\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 686 leaves) :

$$-\frac{4\,(13A-6B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{4\,(13A-6B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{1}{480\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\left(1235\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-870\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-3805\,A\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+1830\,B\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+4329\,A\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-\right.$$

$$2094\,B\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-1989\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+1314\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+3575\,A\,\mathrm{Sin}\left[2c+\frac{d\,x}{2}\right]-1650\,B\,\mathrm{Sin}\left[2c+\frac{d\,x}{2}\right]+475\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$

$$450\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-2005\,A\,\mathrm{Sin}\left[2c+\frac{3\,d\,x}{2}\right]+1230\,B\,\mathrm{Sin}\left[2c+\frac{3\,d\,x}{2}\right]+2275\,A\,\mathrm{Sin}\left[3c+\frac{3\,d\,x}{2}\right]-1050\,B\,\mathrm{Sin}\left[3c+\frac{3\,d\,x}{2}\right]-$$

$$2673\,A\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+1278\,B\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]-105\,A\,\mathrm{Sin}\left[2c+\frac{5\,d\,x}{2}\right]-90\,B\,\mathrm{Sin}\left[2c+\frac{5\,d\,x}{2}\right]-1593\,A\,\mathrm{Sin}\left[3c+\frac{5\,d\,x}{2}\right]+$$

$$918\,B\,\mathrm{Sin}\left[3c+\frac{5\,d\,x}{2}\right]+975\,A\,\mathrm{Sin}\left[4c+\frac{5\,d\,x}{2}\right]-450\,B\,\mathrm{Sin}\left[4c+\frac{5\,d\,x}{2}\right]-1325\,A\,\mathrm{Sin}\left[2c+\frac{7\,d\,x}{2}\right]+630\,B\,\mathrm{Sin}\left[2c+\frac{7\,d\,x}{2}\right]-$$

$$255\,A\,\mathrm{Sin}\left[3c+\frac{7\,d\,x}{2}\right]+60\,B\,\mathrm{Sin}\left[3c+\frac{7\,d\,x}{2}\right]-875\,A\,\mathrm{Sin}\left[4c+\frac{7\,d\,x}{2}\right]+480\,B\,\mathrm{Sin}\left[4c+\frac{7\,d\,x}{2}\right]+195\,A\,\mathrm{Sin}\left[5c+\frac{7\,d\,x}{2}\right]-90\,B\,\mathrm{Sin}\left[5c+\frac{7\,d\,x}{2}\right]-$$

$$\left.304\,A\,\mathrm{Sin}\left[3c+\frac{9\,d\,x}{2}\right]+144\,B\,\mathrm{Sin}\left[3c+\frac{9\,d\,x}{2}\right]-90\,A\,\mathrm{Sin}\left[4c+\frac{9\,d\,x}{2}\right]+30\,B\,\mathrm{Sin}\left[4c+\frac{9\,d\,x}{2}\right]-214\,A\,\mathrm{Sin}\left[5c+\frac{9\,d\,x}{2}\right]+114\,B\,\mathrm{Sin}\left[5c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 65: Result more than twice size of optimal antiderivative.**

$$\int \frac{\mathrm{Cos}[c+d\,x]^5\,(A+B\,\mathrm{Cos}[c+d\,x])}{(a+a\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 229 leaves, 5 steps) :

$$-\frac{(8A-21B)\,x}{2\,a^4}+\frac{8\,(83A-216B)\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d}-\frac{(8A-21B)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a^4\,d}+\frac{(52A-129B)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])^2}+$$

$$\frac{4\,(83A-216B)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(A-B)\,\mathrm{Cos}[c+d\,x]^5\,\mathrm{Sin}[c+d\,x]}{7\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}+\frac{(A-2B)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{5\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$

Result (type 3, 555 leaves) :

$$\frac{1}{6720\, a^4\, d\, (1+\text{Cos}[c+d\,x])^4}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(-14\,700\,(8\,A-21\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-14\,700\,(8\,A-21\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-70\,560\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$185\,220\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-70\,560\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+185\,220\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-23\,520\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$61\,740\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-23\,520\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+61\,740\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-3360\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+$$
$$8820\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]-3360\,A\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]+8820\,B\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]+243\,320\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-539\,490\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-$$
$$184\,520\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+386\,190\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+184\,464\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-422\,478\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-72\,240\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$132\,930\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+77\,168\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-181\,461\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-8400\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3675\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$
$$15\,164\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-36\,003\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+2940\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-9555\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+420\,A\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-$$
$$\left.945\,B\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+420\,A\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-945\,B\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+105\,B\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+105\,B\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 66: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d\,x]^4\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 185 leaves, 8 steps):

$$\frac{(A-4\,B)\,x}{a^4}-\frac{(55\,A-244\,B)\,\text{Sin}[c+d\,x]}{105\,a^4\,d}+\frac{(25\,A-88\,B)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])^2}-$$
$$\frac{(A-4\,B)\,\text{Sin}[c+d\,x]}{a^4\,d\,(1+\text{Cos}[c+d\,x])}+\frac{(A-B)\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{7\,d\,(a+a\,\text{Cos}[c+d\,x])^4}+\frac{(5\,A-12\,B)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{35\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

Result (type 3, 481 leaves):

$$\frac{1}{1680\, a^4\, d\, (1+\text{Cos}[c+d\,x])^4}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(7350\,(A-4\,B)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+7350\,(A-4\,B)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+4410\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-17\,640\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+4410\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-17\,640\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+1470\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-5880\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+1470\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-5880\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+210\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]-840\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+210\,A\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]-840\,B\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]-19\,880\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+60\,830\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,520\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-46\,130\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-14\,280\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+46\,116\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+7560\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-18\,060\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-5600\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+19\,292\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+1680\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-2100\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-1040\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3791\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+735\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+105\,B\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+105\,B\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 67: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^3\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 154 leaves, 6 steps):

$$\frac{B\,x}{a^4}-\frac{(6\,A-55\,B)\,\text{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])^2}+\frac{(12\,A-215\,B)\,\text{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])}+\frac{(A-B)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{7\,d\,(a+a\,\text{Cos}[c+d\,x])^4}+\frac{(3\,A-10\,B)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{35\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

Result (type 3, 329 leaves):

$$\frac{1}{13\,440\,a^4\,d}\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^7\left(3675\,B\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+3675\,B\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+2205\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+2205\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+735\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+735\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+105\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+105\,B\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]+1260\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9940\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-1260\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+8260\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+882\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-7140\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-630\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+3780\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+294\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2800\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-210\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+840\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+72\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-520\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 72: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 175 leaves, 8 steps):

$$-\frac{(4A-B)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{a^4 d}+\frac{8\,(83A-20B)\,\text{Tan}[c+d x]}{105\,a^4 d}-\frac{(88A-25B)\,\text{Tan}[c+d x]}{105\,a^4 d\,(1+\text{Cos}[c+d x])^2}-\frac{(4A-B)\,\text{Tan}[c+d x]}{a^4 d\,(1+\text{Cos}[c+d x])}-\frac{(A-B)\,\text{Tan}[c+d x]}{7 d\,(a+a\,\text{Cos}[c+d x])^4}-\frac{(12A-5B)\,\text{Tan}[c+d x]}{35\,a d\,(a+a\,\text{Cos}[c+d x])^3}$$

Result (type 3, 670 leaves):

$$\frac{16\,(4A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^8\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d x])^4}-\frac{16\,(4A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^8\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d x])^4}+\frac{1}{1680\,d\,(a+a\,\text{Cos}[c+d x])^4}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]\,\text{Sec}[c+d x]$$
$$\left(-10780\,A\,\text{Sin}\left[\frac{d x}{2}\right]+4165\,B\,\text{Sin}\left[\frac{d x}{2}\right]+18788\,A\,\text{Sin}\left[\frac{3 d x}{2}\right]-4445\,B\,\text{Sin}\left[\frac{3 d x}{2}\right]-20524\,A\,\text{Sin}\left[c-\frac{d x}{2}\right]+4795\,B\,\text{Sin}\left[c-\frac{d x}{2}\right]+\right.$$
$$14644\,A\,\text{Sin}\left[c+\frac{d x}{2}\right]-4795\,B\,\text{Sin}\left[c+\frac{d x}{2}\right]-16660\,A\,\text{Sin}\left[2c+\frac{d x}{2}\right]+4165\,B\,\text{Sin}\left[2c+\frac{d x}{2}\right]-4690\,A\,\text{Sin}\left[c+\frac{3 d x}{2}\right]+2275\,B\,\text{Sin}\left[c+\frac{3 d x}{2}\right]+$$
$$14378\,A\,\text{Sin}\left[2c+\frac{3 d x}{2}\right]-4445\,B\,\text{Sin}\left[2c+\frac{3 d x}{2}\right]-9100\,A\,\text{Sin}\left[3c+\frac{3 d x}{2}\right]+2275\,B\,\text{Sin}\left[3c+\frac{3 d x}{2}\right]+11668\,A\,\text{Sin}\left[c+\frac{5 d x}{2}\right]-$$
$$2785\,B\,\text{Sin}\left[c+\frac{5 d x}{2}\right]-630\,A\,\text{Sin}\left[2c+\frac{5 d x}{2}\right]+735\,B\,\text{Sin}\left[2c+\frac{5 d x}{2}\right]+9358\,A\,\text{Sin}\left[3c+\frac{5 d x}{2}\right]-2785\,B\,\text{Sin}\left[3c+\frac{5 d x}{2}\right]-$$
$$2940\,A\,\text{Sin}\left[4c+\frac{5 d x}{2}\right]+735\,B\,\text{Sin}\left[4c+\frac{5 d x}{2}\right]+4228\,A\,\text{Sin}\left[2c+\frac{7 d x}{2}\right]-1015\,B\,\text{Sin}\left[2c+\frac{7 d x}{2}\right]+315\,A\,\text{Sin}\left[3c+\frac{7 d x}{2}\right]+$$
$$105\,B\,\text{Sin}\left[3c+\frac{7 d x}{2}\right]+3493\,A\,\text{Sin}\left[4c+\frac{7 d x}{2}\right]-1015\,B\,\text{Sin}\left[4c+\frac{7 d x}{2}\right]-420\,A\,\text{Sin}\left[5c+\frac{7 d x}{2}\right]+105\,B\,\text{Sin}\left[5c+\frac{7 d x}{2}\right]+$$
$$\left.664\,A\,\text{Sin}\left[3c+\frac{9 d x}{2}\right]-160\,B\,\text{Sin}\left[3c+\frac{9 d x}{2}\right]+105\,A\,\text{Sin}\left[4c+\frac{9 d x}{2}\right]+559\,A\,\text{Sin}\left[5c+\frac{9 d x}{2}\right]-160\,B\,\text{Sin}\left[5c+\frac{9 d x}{2}\right]\right)$$

- **Problem 73: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^3}{(a+a\,\text{Cos}[c+d x])^4}\,dx$$

Optimal (type 3, 232 leaves, 9 steps):

$$\frac{(21A-8B)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{2\,a^4 d}-\frac{8\,(216A-83B)\,\text{Tan}[c+d x]}{105\,a^4 d}+\frac{(21A-8B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{2\,a^4 d}-\frac{(129A-52B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{105\,a^4 d\,(1+\text{Cos}[c+d x])^2}-\frac{4\,(216A-83B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{105\,a^4 d\,(1+\text{Cos}[c+d x])}-\frac{(A-B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{7 d\,(a+a\,\text{Cos}[c+d x])^4}-\frac{(2A-B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{5\,a d\,(a+a\,\text{Cos}[c+d x])^3}$$

Result (type 3, 798 leaves):

$$-\frac{8\,(21\,A-8\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}+$$

$$\frac{8\,(21\,A-8\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}+\frac{1}{6720\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2$$

$$\left(73\,206\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-38\,668\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-166\,668\,A\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+64\,384\,B\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+183\,162\,A\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-70\,896\,B\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-\right.$$

$$100\,842\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+50\,316\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+155\,526\,A\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]-59\,248\,B\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+37\,380\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$

$$22\,820\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-101\,148\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+48\,004\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+102\,900\,A\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-39\,200\,B\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-$$

$$119\,364\,A\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+46\,032\,B\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+8820\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-8750\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-78\,204\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$

$$35\,742\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+49\,980\,A\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-19\,040\,B\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-64\,053\,A\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+24\,664\,B\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$

$$3885\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-1050\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-44\,733\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+19\,834\,B\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,435\,A\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-$$

$$5880\,B\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-21\,987\,A\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+8456\,B\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-3675\,A\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+630\,B\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-$$

$$16\,107\,A\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+6986\,B\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+2205\,A\,\mathrm{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]-840\,B\,\mathrm{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]-3456\,A\,\mathrm{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]+$$

$$\left.1328\,B\,\mathrm{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]-840\,A\,\mathrm{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+210\,B\,\mathrm{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]-2616\,A\,\mathrm{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]+1118\,B\,\mathrm{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 78: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 66 leaves, 3 steps):

$$\frac{2\,\sqrt{a}\,\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a\,B\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 1393 leaves):

$$-\left(\left(\left(\left(\frac{1}{4}-\frac{i}{4}\right)A\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,\,e^{2\,i\,(c+d\,x)}+$$

$$\left.\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\right/$$

$$\left(\left(\left(-1-i\right)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+d x)}-4 i\,e^{i(c+d x)}+2\sqrt{2}\,e^{\frac{3}{2}i(c+d x)}+i\,e^{2 i(c+d x)}\right)^2\right)\right)-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]}{\sqrt{2}\,d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]}{\sqrt{2}\,d}-$$

$$\frac{A\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]}{2\sqrt{2}\,d}-$$

$$\frac{A\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]}{2\sqrt{2}\,d}+$$

$$\frac{2\,B\,\text{Cos}\left[\frac{d x}{2}\right]\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}-$$

$$\frac{2\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Cot}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]}{d\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\frac{1}{d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)}$$

$$\sqrt{2}\,A\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)+$$

$$\frac{2\,B\,\text{Cos}\left[\frac{c}{2}\right]\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{d}$$

- **Problem 79: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+a\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 68 leaves, 3 steps):

$$\frac{\sqrt{a}\,(A+2\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{a\,A\,\text{Tan}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 470 leaves):

$$\frac{1}{8\,d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(2\,\sqrt{2}\,(A+2\,B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{2\,i\,(A+2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+\right.$$

$$\frac{2\,i\,(A+2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{(A+2\,B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{(A+2\,B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\left.\frac{4\,A}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-\frac{4\,A}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 80: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+a\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 117 leaves, 4 steps):

$$\frac{\sqrt{a}\,(3\,A+4\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a\,(3\,A+4\,B)\,\text{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 567 leaves):

$$\frac{1}{32\,d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-2\,i\,\sqrt{2}\,(3\,A+4\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]-\right.$$

$$2\,i\,\sqrt{2}\,(3\,A+4\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]+2\,\sqrt{2}\,(3\,A+4\,B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-$$

$$\sqrt{2}\,(3\,A+4\,B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\sqrt{2}\,(3\,A+4\,B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$

$$\frac{8\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,(3\,A+4\,B)\,\text{Cos}\left[\frac{c}{2}\right]-4\,(A+4\,B)\,\text{Sin}\left[\frac{c}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\left.\frac{8\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{4\left((3\,A+4\,B)\,\text{Cos}\left[\frac{c}{2}\right]+(A+4\,B)\,\text{Sin}\left[\frac{c}{2}\right]\right)}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right)$$

- **Problem 81: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\;(A+B\,\text{Cos}[c+d\,x])\;\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 160 leaves, 5 steps):

$$\frac{\sqrt{a}\,(5\,A+6\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a\,(5\,A+6\,B)\,\text{Tan}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,(5\,A+6\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1108 leaves):

$$\frac{i\,(-5\,A-6\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{16\,\sqrt{2}\,d}+$$

$$\frac{i\,(-5\,A-6\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{16\,\sqrt{2}\,d}+$$

$$\frac{(5\,A+6\,B)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{16\,\sqrt{2}\,d}+$$

$$\frac{(-5\,A-6\,B)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{32\,\sqrt{2}\,d}+$$

$$\frac{(-5\,A-6\,B)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{32\,\sqrt{2}\,d}+$$

$$\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{12\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+2\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{8\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(5\,A\,\text{Cos}\left[\frac{c}{2}\right]+6\,B\,\text{Cos}\left[\frac{c}{2}\right]-3\,A\,\text{Sin}\left[\frac{c}{2}\right]-2\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{12\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+2\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{8\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(-5\,A\,\text{Cos}\left[\frac{c}{2}\right]-6\,B\,\text{Cos}\left[\frac{c}{2}\right]-3\,A\,\text{Sin}\left[\frac{c}{2}\right]-2\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 86: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 105 leaves, 4 steps):

$$\frac{2\,a^{3/2}\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^2\,(3\,A+4\,B)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,a\,B\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 1531 leaves):

$$-\Bigg(\Bigg(\Bigg(\left(\frac{1}{8}-\frac{i}{8}\right) A \left(1+e^{i c}\right) \Big(\sqrt{2}-(1-i)\, e^{\frac{i c}{2}}+(16-16 i)\, e^{\frac{3 i c}{2}+i d x}+(20+20 i) \sqrt{2}\, e^{2 i c+\frac{3 i d x}{2}}-(34-34 i)\, e^{\frac{5 i c}{2}+2 i d x}-(20+20 i) \sqrt{2}\, e^{3 i c+\frac{5 i d x}{2}}+$$
$$(16-16 i)\, e^{\frac{7 i c}{2}+3 i d x}+(4+4 i) \sqrt{2}\, e^{4 i c+\frac{7 i d x}{2}}-(1-i)\, e^{\frac{9 i c}{2}+4 i d x}+8 i\, e^{\frac{1}{2} i (c+d x)}-16 \sqrt{2}\, e^{i (c+d x)}-40 i\, e^{\frac{3}{2} i (c+d x)}+34 \sqrt{2}\, e^{2 i (c+d x)}+$$
$$40 i\, e^{\frac{5}{2} i (c+d x)}-16 \sqrt{2}\, e^{3 i (c+d x)}-8 i\, e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\, e^{4 i (c+d x)}-(4+4 i) \sqrt{2}\, e^{\frac{1}{2} i (2 c+d x)}\Big)\, x\, (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\Bigg)\Bigg/$$
$$\Bigg(\left((-1-i)+\sqrt{2}\, e^{\frac{i c}{2}}\right) \left(-1+e^{i c}\right) \left(i-2 \sqrt{2}\, e^{\frac{1}{2} i (c+d x)}-4 i\, e^{i (c+d x)}+2 \sqrt{2}\, e^{\frac{3}{2} i (c+d x)}+i\, e^{2 i (c+d x)}\right)^2\Bigg)\Bigg)-$$

$$\frac{i A\, \text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\, \text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 \sqrt{2}\, d}-$$

$$\frac{i A\, \text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\, \text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 \sqrt{2}\, d}-$$

$$\frac{A (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Log}\left[2-\sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{4 \sqrt{2}\, d}-$$

$$\frac{A (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Log}\left[2+\sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{4 \sqrt{2}\, d}+$$

$$\frac{(2 A+3 B)\, \text{Cos}\left[\frac{d x}{2}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{c}{2}\right]}{2 d}-$$

$$\frac{i A\, \text{ArcTan}\left[\frac{2 i\, \text{Cos}\left[\frac{c}{2}\right]-i \left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Cot}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{d \sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\Bigg(A (a (1+\text{Cos}[c+d x]))^{3/2}\, \text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\,\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\,\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{B\,\mathrm{Cos}\left[\frac{3\,d\,x}{2}\right]\,\left(a\,\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{3\,c}{2}\right]}{6\,d}+$$

$$\frac{(2\,A+3\,B)\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\left(a\,\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+$$

$$\frac{B\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\,\left(a\,\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{6\,d}$$

- **Problem 87: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 103 leaves, 4 steps):

$$\frac{a^{3/2}\,(3\,A+2\,B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}-\frac{a^2\,(A-2\,B)\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,A\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 514 leaves):

$$\frac{1}{16\,d}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(2\,\sqrt{2}\,(3\,A+2\,B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$

$$16\,B\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{2\,i\,(3\,A+2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\,\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]\,\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{2\,i\,(3\,A+2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(1+\sqrt{2}\right)\,\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]\,\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{(3\,A+2\,B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{(3\,A+2\,B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\left.16\,B\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+\frac{4\,A}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-\frac{4\,A}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 88: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 119 leaves, 4 steps):

$$\frac{a^{3/2}\,(7\,A+12\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a^2\,(5\,A+4\,B)\,\text{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 573 leaves):

$$\frac{1}{64\,d}\left(a\left(1+\cos[c+d\,x]\right)\right)^{3/2}\sec\left[\frac{1}{2}(c+d\,x)\right]^3\left(-2\,i\,\sqrt{2}\,(7A+12B)\,\text{ArcTan}\left[\frac{\cos\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\sin\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\cos\left[\frac{1}{4}(c+d\,x)\right]-\sin\left[\frac{1}{4}(c+d\,x)\right]}\right]-\right.$$

$$2\,i\,\sqrt{2}\,(7A+12B)\,\text{ArcTan}\left[\frac{\cos\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\sin\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\cos\left[\frac{1}{4}(c+d\,x)\right]-\sin\left[\frac{1}{4}(c+d\,x)\right]}\right]+2\sqrt{2}\,(7A+12B)\,\text{Log}\left[\sqrt{2}+2\sin\left[\frac{1}{2}(c+d\,x)\right]\right]-$$

$$\sqrt{2}\,(7A+12B)\,\text{Log}\left[2-\sqrt{2}\cos\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\sin\left[\frac{1}{2}(c+d\,x)\right]\right]-\sqrt{2}\,(7A+12B)\,\text{Log}\left[2+\sqrt{2}\cos\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\sin\left[\frac{1}{2}(c+d\,x)\right]\right]+$$

$$\frac{8A\sin\left[\frac{d\,x}{2}\right]}{\left(\cos\left[\frac{c}{2}\right]-\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{1}{2}(c+d\,x)\right]-\sin\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4(7A+4B)\cos\left[\frac{c}{2}\right]-4(5A+4B)\sin\left[\frac{c}{2}\right]}{\left(\cos\left[\frac{c}{2}\right]-\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{1}{2}(c+d\,x)\right]-\sin\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\left.\frac{8A\sin\left[\frac{d\,x}{2}\right]}{\left(\cos\left[\frac{c}{2}\right]+\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{1}{2}(c+d\,x)\right]+\sin\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{4\left((7A+4B)\cos\left[\frac{c}{2}\right]+(5A+4B)\sin\left[\frac{c}{2}\right]\right)}{\left(\cos\left[\frac{c}{2}\right]+\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{1}{2}(c+d\,x)\right]+\sin\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)$$

- **Problem 89: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\cos[c+d\,x])^{3/2}\,(A+B\cos[c+d\,x])\,\sec[c+d\,x]^4\,dx$$

Optimal (type 3, 164 leaves, 5 steps):

$$\frac{a^{3/2}\,(11A+14B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{a+a\cos[c+d\,x]}}\right]}{8\,d}+\frac{a^2\,(11A+14B)\,\tan[c+d\,x]}{8\,d\,\sqrt{a+a\cos[c+d\,x]}}+$$

$$\frac{a^2\,(7A+6B)\,\sec[c+d\,x]\,\tan[c+d\,x]}{12\,d\,\sqrt{a+a\cos[c+d\,x]}}+\frac{a\,A\,\sqrt{a+a\cos[c+d\,x]}\,\sec[c+d\,x]^2\,\tan[c+d\,x]}{3\,d}$$

Result (type 3, 1132 leaves):

$$\frac{\mathbb{i}\,(-11\,A-14\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{32\,\sqrt{2}\,d}+$$

$$\frac{\mathbb{i}\,(-11\,A-14\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{32\,\sqrt{2}\,d}+$$

$$\frac{(11\,A+14\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{32\,\sqrt{2}\,d}+$$

$$\frac{(-11\,A-14\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{64\,\sqrt{2}\,d}+$$

$$\frac{(-11\,A-14\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{64\,\sqrt{2}\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+2\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(11\,A\,\text{Cos}\left[\frac{c}{2}\right]+14\,B\,\text{Cos}\left[\frac{c}{2}\right]-5\,A\,\text{Sin}\left[\frac{c}{2}\right]-10\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+2\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-11\,A\,\text{Cos}\left[\frac{c}{2}\right]-14\,B\,\text{Cos}\left[\frac{c}{2}\right]-5\,A\,\text{Sin}\left[\frac{c}{2}\right]-10\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 90: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 209 leaves, 6 steps) :

$$\frac{a^{3/2}(75A+88B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{64 d}+\frac{a^2(75A+88B)\,\text{Tan}[c+d x]}{64 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a^2(75A+88B)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{96 d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$

$$\frac{a^2(9A+8B)\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{24 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a A\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]}{4 d}$$

Result (type 3, 1416 leaves) :

$$\frac{i(-75A-88B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right](a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\sqrt{2}\,d}+$$

$$\frac{i(-75A-88B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right](a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\sqrt{2}\,d}+$$

$$\frac{(75A+88B)(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\sqrt{2}\,d}+$$

$$\frac{(-75A-88B)(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{512\sqrt{2}\,d}+$$

$$\frac{(-75A-88B)(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{512\sqrt{2}\,d}+$$

$$\frac{A(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Sin}\left[\frac{d x}{2}\right]}{32 d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+$$

$$\frac{(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(15A\,\text{Cos}\left[\frac{c}{2}\right]+8B\,\text{Cos}\left[\frac{c}{2}\right]-9A\,\text{Sin}\left[\frac{c}{2}\right]-8B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{192 d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(19A\,\text{Sin}\left[\frac{d x}{2}\right]+24B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{128 d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(75A\,\text{Cos}\left[\frac{c}{2}\right]+88B\,\text{Cos}\left[\frac{c}{2}\right]-37A\,\text{Sin}\left[\frac{c}{2}\right]-40B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{256 d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+$$

$$\frac{A(a(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Sin}\left[\frac{d x}{2}\right]}{32 d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-15\,A\,\text{Cos}\left[\frac{c}{2}\right]-8\,B\,\text{Cos}\left[\frac{c}{2}\right]-9\,A\,\text{Sin}\left[\frac{c}{2}\right]-8\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{192\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(19\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+24\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{128\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-75\,A\,\text{Cos}\left[\frac{c}{2}\right]-88\,B\,\text{Cos}\left[\frac{c}{2}\right]-37\,A\,\text{Sin}\left[\frac{c}{2}\right]-40\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{256\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

### Problem 94: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 142 leaves, 5 steps):

$$\frac{2\,a^{5/2}\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^3\,(35\,A+32\,B)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^2\,(5\,A+8\,B)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,a\,B\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 3, 1640 leaves):

$$-\left(\left(\left(\left(\frac{1}{16}-\frac{i}{16}\right)\,A\,\left(1+e^{i\,c}\right)\,\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right)\Bigg/$$

$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\,\left(-1+e^{i\,c}\right)\,\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}+$$

$$\frac{5\,(A+B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{c}{2}\right]}{4\,d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2\,d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(2\,\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(2\,A+5\,B)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{3\,c}{2}\right]}{24\,d}+$$

$$\frac{B\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{5\,c}{2}\right]}{40\,d}+$$

$$\frac{5\,(A+B)\,\text{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+$$

$$\frac{(2\,A+5\,B)\,\text{Cos}\left[\frac{3\,c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{24\,d}+$$

$$\frac{B\,\text{Cos}\left[\frac{5\,c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{40\,d}$$

- **Problem 95: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a + a\,\text{Cos}[c + d\,x])^{5/2}\,(A + B\,\text{Cos}[c + d\,x])\,\text{Sec}[c + d\,x]^2\,dx$$

Optimal (type 3, 144 leaves, 5 steps):

$$\frac{a^{5/2}\,(5\,A + 2\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d} + \frac{a^3\,(3\,A + 14\,B)\,\text{Sin}[c + d\,x]}{3\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} - \frac{a^2\,(3\,A - 2\,B)\,\sqrt{a + a\,\text{Cos}[c + d\,x]}\,\text{Sin}[c + d\,x]}{3\,d} + \frac{a\,A\,(a + a\,\text{Cos}[c + d\,x])^{3/2}\,\text{Tan}[c + d\,x]}{d}$$

Result (type 3, 460 leaves):

$$\frac{1}{96\,d}\,(a\,(1 + \text{Cos}[c + d\,x]))^{5/2}\,\text{Sec}\left[\frac{1}{2}\,(c + d\,x)\right]^5\left(-6\,i\,\sqrt{2}\,(5\,A + 2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c + d\,x)\right] - \left(-1 + \sqrt{2}\right)\text{Sin}\left[\frac{1}{4}\,(c + d\,x)\right]}{\left(1 + \sqrt{2}\right)\text{Cos}\left[\frac{1}{4}\,(c + d\,x)\right] - \text{Sin}\left[\frac{1}{4}\,(c + d\,x)\right]}\right] - \right.$$
$$6\,i\,\sqrt{2}\,(5\,A + 2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c + d\,x)\right] - \left(1 + \sqrt{2}\right)\text{Sin}\left[\frac{1}{4}\,(c + d\,x)\right]}{\left(-1 + \sqrt{2}\right)\text{Cos}\left[\frac{1}{4}\,(c + d\,x)\right] - \text{Sin}\left[\frac{1}{4}\,(c + d\,x)\right]}\right] + 6\,\sqrt{2}\,(5\,A + 2\,B)\,\text{Log}\left[\sqrt{2} + 2\,\text{Sin}\left[\frac{1}{2}\,(c + d\,x)\right]\right] -$$
$$3\,\sqrt{2}\,(5\,A + 2\,B)\,\text{Log}\left[2 - \sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c + d\,x)\right] - \sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c + d\,x)\right]\right] - 3\,\sqrt{2}\,(5\,A + 2\,B)\,\text{Log}\left[2 + \sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c + d\,x)\right] - \sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c + d\,x)\right]\right] +$$
$$24\,(2\,A + 5\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right] + 8\,B\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right] + 24\,(2\,A + 5\,B)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right] +$$
$$\left.8\,B\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right] + \frac{12\,A}{\text{Cos}\left[\frac{1}{2}\,(c + d\,x)\right] - \text{Sin}\left[\frac{1}{2}\,(c + d\,x)\right]} - \frac{12\,A}{\text{Cos}\left[\frac{1}{2}\,(c + d\,x)\right] + \text{Sin}\left[\frac{1}{2}\,(c + d\,x)\right]}\right)$$

- **Problem 96: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a + a\,\text{Cos}[c + d\,x])^{5/2}\,(A + B\,\text{Cos}[c + d\,x])\,\text{Sec}[c + d\,x]^3\,dx$$

Optimal (type 3, 156 leaves, 5 steps):

$$\frac{a^{5/2}\,(19\,A + 20\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d} - \frac{a^3\,(9\,A - 4\,B)\,\text{Sin}[c + d\,x]}{4\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} + \frac{a^2\,(7\,A + 4\,B)\,\sqrt{a + a\,\text{Cos}[c + d\,x]}\,\text{Tan}[c + d\,x]}{4\,d} + \frac{a\,A\,(a + a\,\text{Cos}[c + d\,x])^{3/2}\,\text{Sec}[c + d\,x]\,\text{Tan}[c + d\,x]}{2\,d}$$

Result (type 3, 605 leaves):

$$\frac{1}{128\,d}\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{5/2}\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\left(-2\,i\sqrt{2}\,(19\,A+20\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]-\right.$$

$$2\,i\sqrt{2}\,(19\,A+20\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]+$$

$$2\sqrt{2}\,(19\,A+20\,B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\sqrt{2}\,(19\,A+20\,B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-$$

$$\sqrt{2}\,(19\,A+20\,B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+64\,B\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+64\,B\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$

$$\frac{8\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4\,(11\,A+4\,B)\,\text{Cos}\left[\frac{c}{2}\right]-4\,(9\,A+4\,B)\,\text{Sin}\left[\frac{c}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\left.\frac{8\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{4\left((11\,A+4\,B)\,\text{Cos}\left[\frac{c}{2}\right]+(9\,A+4\,B)\,\text{Sin}\left[\frac{c}{2}\right]\right)}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)$$

- **Problem 97: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 164 leaves, 5 steps):

$$\frac{a^{5/2}\,(25\,A+38\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a^3\,(49\,A+54\,B)\,\text{Tan}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a^2\,(3\,A+2\,B)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{4\,d}+\frac{a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 1132 leaves):

$$\frac{i\,(-25A-38B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}+$$

$$\frac{i\,(-25A-38B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}+$$

$$\frac{(25A+38B)\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}+$$

$$\frac{(-25A-38B)\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{128\sqrt{2}\,d}+$$

$$\frac{(-25A-38B)\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{128\sqrt{2}\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{48\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\left(5\,A\,\text{Sin}\left[\frac{dx}{2}\right]+2\,B\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\left(25\,A\,\text{Cos}\left[\frac{c}{2}\right]+22\,B\,\text{Cos}\left[\frac{c}{2}\right]-15\,A\,\text{Sin}\left[\frac{c}{2}\right]-18\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{48\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\left(5\,A\,\text{Sin}\left[\frac{dx}{2}\right]+2\,B\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\left(-25\,A\,\text{Cos}\left[\frac{c}{2}\right]-22\,B\,\text{Cos}\left[\frac{c}{2}\right]-15\,A\,\text{Sin}\left[\frac{c}{2}\right]-18\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 98: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+dx])^{5/2}\,(A+B\,\text{Cos}[c+dx])\,\text{Sec}[c+dx]^5\,dx$$

Optimal (type 3, 209 leaves, 6 steps):

$$\frac{a^{5/2}\,(163A+200B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{64\,d}+\frac{a^3\,(163A+200B)\,\text{Tan}[c+dx]}{64\,d\,\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{a^3\,(95A+104B)\,\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{96\,d\,\sqrt{a+a\,\text{Cos}[c+dx]}}+$$

$$\frac{a^2\,(11A+8B)\,\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{24\,d}+\frac{a\,A\,(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sec}[c+dx]^3\,\text{Tan}[c+dx]}{4\,d}$$

Result (type 3, 1416 leaves):

$$\frac{i\,(-163\,A-200\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{512\,\sqrt{2}\,d}+$$

$$\frac{i\,(-163\,A-200\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{512\,\sqrt{2}\,d}+$$

$$\frac{(163\,A+200\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{512\,\sqrt{2}\,d}+$$

$$\frac{(-163\,A-200\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{(-163\,A-200\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(23\,A\,\text{Cos}\left[\frac{c}{2}\right]+8\,B\,\text{Cos}\left[\frac{c}{2}\right]-17\,A\,\text{Sin}\left[\frac{c}{2}\right]-8\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(43\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+40\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{256\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(163\,A\,\text{Cos}\left[\frac{c}{2}\right]+200\,B\,\text{Cos}\left[\frac{c}{2}\right]-77\,A\,\text{Sin}\left[\frac{c}{2}\right]-120\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(-23\,A\,\text{Cos}\left[\frac{c}{2}\right]-8\,B\,\text{Cos}\left[\frac{c}{2}\right]-17\,A\,\text{Sin}\left[\frac{c}{2}\right]-8\,B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(43\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+40\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{256\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(-163\,A\,\mathrm{Cos}\left[\frac{c}{2}\right]-200\,B\,\mathrm{Cos}\left[\frac{c}{2}\right]-77\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-120\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 99: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 254 leaves, 7 steps):

$$\frac{a^{5/2}\,(283\,A+326\,B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{128\,d}+\frac{a^3\,(283\,A+326\,B)\,\mathrm{Tan}[c+d\,x]}{128\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a^3\,(283\,A+326\,B)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{192\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^3\,(157\,A+170\,B)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{240\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a^2\,(13\,A+10\,B)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{40\,d}+\frac{a\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]}{5\,d}$$

Result (type 3, 759 leaves):

$$\frac{i\,(-283\,A-326\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{i\,(-283\,A-326\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{(283\,A+326\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{(-283\,A-326\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2048\,\sqrt{2}\,d}+$$

$$\frac{(-283\,A-326\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2048\,\sqrt{2}\,d}+$$

$$\frac{1}{122\,880\,d}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sec}[c+d\,x]^5$$
$$\left(21\,610\,A\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+20\,660\,B\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+2080\,A\,\text{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]-3520\,B\,\text{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]+20\,376\,A\,\text{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]+\right.$$
$$\left.20\,400\,B\,\text{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]+1415\,A\,\text{Sin}\left[\frac{7\,c}{2}+\frac{7\,d\,x}{2}\right]+1630\,B\,\text{Sin}\left[\frac{7\,c}{2}+\frac{7\,d\,x}{2}\right]+4245\,A\,\text{Sin}\left[\frac{9\,c}{2}+\frac{9\,d\,x}{2}\right]+4890\,B\,\text{Sin}\left[\frac{9\,c}{2}+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 104: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 91 leaves, 5 steps):

$$\frac{2\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 1682 leaves):

$$-\left(\left(\left(\left(\frac{1}{2}-\frac{i}{2}\right)\,A\,\left(1+e^{i\,c}\right)\right.\right.\right.$$
$$\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+\right.$$
$$(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-$$

$$16\sqrt{2}\, e^{3 i (c+d x)} - 8 i\, e^{\frac{7}{2} i (c+d x)} + \sqrt{2}\, e^{4 i (c+d x)} - (4+4 i)\sqrt{2}\, e^{\frac{1}{2} i (2 c+d x)}\Big)\, x \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x]\, (B + A \operatorname{Sec}[c+d x])\Big) \Big/$$

$$\left(\left(\left((-1-i)+\sqrt{2}\, e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i - 2\sqrt{2}\, e^{\frac{1}{2} i (c+d x)} - 4 i\, e^{i (c+d x)} + 2\sqrt{2}\, e^{\frac{3}{2} i (c+d x)} + i\, e^{2 i (c+d x)}\right)^2 \sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])\right)\right) -$$

$$\frac{i\sqrt{2}\, A \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x]\, (B + A \operatorname{Sec}[c+d x])}{d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])} -$$

$$\frac{i\sqrt{2}\, A \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x]\, (B + A \operatorname{Sec}[c+d x])}{d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])} +$$

$$\frac{2\,(A-B) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] (B + A \operatorname{Sec}[c+d x])}{d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])} -$$

$$\frac{2\,(A-B) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] (B + A \operatorname{Sec}[c+d x])}{d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])} -$$

$$\frac{A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Log}\left[2-\sqrt{2}\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] (B + A \operatorname{Sec}[c+d x])}{\sqrt{2}\, d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])} -$$

$$\frac{A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Log}\left[2+\sqrt{2}\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] (B + A \operatorname{Sec}[c+d x])}{\sqrt{2}\, d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])} -$$

$$\frac{4 i A \operatorname{ArcTan}\left[\frac{2 i \operatorname{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\operatorname{Sin}\left[\frac{c}{2}\right]\right)\operatorname{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\operatorname{Cos}\left[\frac{c}{2}\right]^2+4\operatorname{Sin}\left[\frac{c}{2}\right]^2}}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Cot}\left[\frac{c}{2}\right] (B + A \operatorname{Sec}[c+d x])}{d\sqrt{a\,(1+\operatorname{Cos}[c+d x])}\, (A + B \operatorname{Cos}[c+d x])\sqrt{-2+4\operatorname{Cos}\left[\frac{c}{2}\right]^2+4\operatorname{Sin}\left[\frac{c}{2}\right]^2}} +$$

$$\Bigg(2\sqrt{2}\, A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{c}{2}\right] (B + A \operatorname{Sec}[c+d x])$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,\mathbb{i}\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,\mathbb{i}\,\text{Cos}\left[\frac{c}{2}\right]-\mathbb{i}\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(A+B\,\text{Cos}[c+d\,x]\right)\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)$$

- **Problem 105: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 119 leaves, 6 steps):

$$-\frac{(A-2\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{A\,\text{Tan}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 532 leaves):

$$\frac{1}{4\,d\,\sqrt{a\,(1+\cos[c+d\,x])}}\cos\left[\frac{1}{2}(c+d\,x)\right]\left(-8\,(A-B)\,\text{Log}\left[\cos\left[\frac{1}{4}(c+d\,x)\right]-\sin\left[\frac{1}{4}(c+d\,x)\right]\right]+8\,(A-B)\,\text{Log}\left[\cos\left[\frac{1}{4}(c+d\,x)\right]+\sin\left[\frac{1}{4}(c+d\,x)\right]\right]-\right.$$

$$2\sqrt{2}\,(A-2B)\,\text{Log}\left[\sqrt{2}+2\sin\left[\frac{1}{2}(c+d\,x)\right]\right]-\frac{2\,i\,(A-2B)\,\text{ArcTan}\left[\frac{\cos\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\sin\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\cos\left[\frac{1}{4}(c+d\,x)\right]-\sin\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(\sqrt{2}-2\sin\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\sin\left[\frac{c}{2}\right]}-$$

$$\frac{2\,i\,(A-2B)\,\text{ArcTan}\left[\frac{\cos\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\sin\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\cos\left[\frac{1}{4}(c+d\,x)\right]-\sin\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(\sqrt{2}-2\sin\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\sin\left[\frac{c}{2}\right]}-$$

$$\frac{(A-2B)\,\text{Log}\left[2-\sqrt{2}\cos\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\sin\left[\frac{1}{2}(c+d\,x)\right]\right]\left(\sqrt{2}-2\sin\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\sin\left[\frac{c}{2}\right]}-$$

$$\frac{(A-2B)\,\text{Log}\left[2+\sqrt{2}\cos\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\sin\left[\frac{1}{2}(c+d\,x)\right]\right]\left(\sqrt{2}-2\sin\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\sin\left[\frac{c}{2}\right]}+$$

$$\left.\frac{4A}{\cos\left[\frac{1}{2}(c+d\,x)\right]-\sin\left[\frac{1}{2}(c+d\,x)\right]}-\frac{4A}{\cos\left[\frac{1}{2}(c+d\,x)\right]+\sin\left[\frac{1}{2}(c+d\,x)\right]}\right)$$

- **Problem 106: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\cos[c+d\,x])\,\text{Sec}[c+d\,x]^3}{\sqrt{a+a\cos[c+d\,x]}}\,dx$$

Optimal (type 3, 165 leaves, 7 steps):

$$\frac{(7A-4B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{a+a\cos[c+d\,x]}}\right]}{4\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\cos[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{(A-4B)\,\tan[c+d\,x]}{4\,d\,\sqrt{a+a\cos[c+d\,x]}}+\frac{A\,\text{Sec}[c+d\,x]\,\tan[c+d\,x]}{2\,d\,\sqrt{a+a\cos[c+d\,x]}}$$

Result (type 3, 724 leaves):

$$\frac{1}{16\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(32\,(A-B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]-32\,(A-B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]+\right.$$

$$2\sqrt{2}\,(7A-4B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{2\,i\,(7A-4B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{2\,i\,(7A-4B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{(7A-4B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{(7A-4B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$

$$\frac{8\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{4\left((A-4B)\,\text{Cos}\left[\frac{c}{2}\right]+(-3A+4B)\,\text{Sin}\left[\frac{c}{2}\right]\right)}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\left.\frac{8\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4\left((A-4B)\,\text{Cos}\left[\frac{c}{2}\right]+(3A-4B)\,\text{Sin}\left[\frac{c}{2}\right]\right)}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)$$

- **Problem 107: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^4\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 261 leaves, 8 steps):

$$-\frac{(15 A-19 B) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{2 \sqrt{2}\, a^{3/2} d}+\frac{(A-B) \operatorname{Cos}[c+d x]^4 \operatorname{Sin}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(651 A-799 B) \operatorname{Sin}[c+d x]}{105 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}+$$

$$\frac{(63 A-67 B) \operatorname{Cos}[c+d x]^2 \operatorname{Sin}[c+d x]}{70 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(7 A-11 B) \operatorname{Cos}[c+d x]^3 \operatorname{Sin}[c+d x]}{14 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(273 A-397 B) \sqrt{a+a \operatorname{Cos}[c+d x]}\, \operatorname{Sin}[c+d x]}{210 a^2 d}$$

Result (type 3, 713 leaves):

$$\frac{(15 A-19 B) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+\frac{(-15 A+19 B) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+$$

$$\frac{5 (4 A-5 B) \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{c}{2}\right]}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}-\frac{(6 A-11 B) \operatorname{Cos}\left[\frac{3 d x}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{3 c}{2}\right]}{3 d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+$$

$$\frac{(2 A-3 B) \operatorname{Cos}\left[\frac{5 d x}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{5 c}{2}\right]}{5 d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+\frac{B \operatorname{Cos}\left[\frac{7 d x}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{7 c}{2}\right]}{7 d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+\frac{5 (4 A-5 B) \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{d x}{2}\right]}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}-$$

$$\frac{(6 A-11 B) \operatorname{Cos}\left[\frac{3 c}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{3 d x}{2}\right]}{3 d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+\frac{(2 A-3 B) \operatorname{Cos}\left[\frac{5 c}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{5 d x}{2}\right]}{5 d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+\frac{B \operatorname{Cos}\left[\frac{7 c}{2}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Sin}\left[\frac{7 d x}{2}\right]}{7 d (a (1+\operatorname{Cos}[c+d x]))^{3/2}}+$$

$$\frac{(A-B) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\operatorname{Cos}[c+d x]))^{3/2} \left(\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+\frac{(-A+B) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\operatorname{Cos}[c+d x]))^{3/2} \left(\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}$$

- **Problem 112: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(A+B \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{(a+a \operatorname{Cos}[c+d x])^{3/2}}\, dx$$

Optimal (type 3, 127 leaves, 6 steps):

$$\frac{2 A \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{a^{3/2} d}-\frac{(5 A-B) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{2 \sqrt{2}\, a^{3/2} d}-\frac{(A-B) \operatorname{Sin}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 2128 leaves):

$$-\Bigg(\Bigg((1-i) A \left(1+e^{i c}\right)$$

$$\Big(\sqrt{2}-(1-i) e^{\frac{i c}{2}}+(16-16 i) e^{\frac{3 i c}{2}+i d x}+(20+20 i) \sqrt{2}\, e^{2 i c+\frac{3 i d x}{2}}-(34-34 i) e^{\frac{5 i c}{2}+2 i d x}-(20+20 i) \sqrt{2}\, e^{3 i c+\frac{5 i d x}{2}}+(16-16 i) e^{\frac{7 i c}{2}+3 i d x}+$$

$$(4+4 i) \sqrt{2}\, e^{4 i c+\frac{7 i d x}{2}}-(1-i) e^{\frac{9 i c}{2}+4 i d x}+8 i e^{\frac{1}{2} i (c+d x)}-16 \sqrt{2}\, e^{i (c+d x)}-40 i e^{\frac{3}{2} i (c+d x)}+34 \sqrt{2}\, e^{2 i (c+d x)}+40 i e^{\frac{5}{2} i (c+d x)}-$$

$$16 \sqrt{2}\, e^{3 i (c+d x)}-8 i e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\, e^{4 i (c+d x)}-(4+4 i) \sqrt{2}\, e^{\frac{1}{2} i (2 c+d x)}\Big) x \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x] (B+A \operatorname{Sec}[c+d x])\Bigg)\Big/$$

$$\left(\left(\left((-1-i)+\sqrt{2}\,e^{\frac{ic}{2}}\right)\left(-1+e^{ic}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+dx)}-4\,i\,e^{i(c+dx)}+2\sqrt{2}\,e^{\frac{3}{2}i(c+dx)}+i\,e^{2i(c+dx)}\right)^2\right.\right.$$

$$\left.\left.(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])\right)\right)-$$

$$\frac{2\,i\sqrt{2}\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,(B+A\,\text{Sec}[c+dx])}{d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])}+$$

$$\frac{(5A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right](B+A\,\text{Sec}[c+dx])}{d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])}+$$

$$\frac{(-5A+B)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right](B+A\,\text{Sec}[c+dx])}{d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])}-$$

$$\frac{\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right](B+A\,\text{Sec}[c+dx])}{d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])}+$$

$$\left((1-i)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,(B+A\,\text{Sec}[c+dx])\right.$$

$$\left.\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A\,\text{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(\left(\frac{1}{2}+\frac{i}{2}\right)\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right](B+A\,\text{Sec}[c+dx])\right.$$

$$\left.\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A\,\text{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\frac{8\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]\,\text{Cot}\left[\frac{c}{2}\right](B+A\,\text{Sec}[c+dx])}{d\,(a(1+\text{Cos}[c+dx]))^{3/2}(A+B\,\text{Cos}[c+dx])\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(4\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{c}{2}\right](B+A\,\text{Sec}[c+d\,x])\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{(-A+B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,(B+A\,\text{Sec}[c+d\,x])}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{(A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,(B+A\,\text{Sec}[c+d\,x])}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 113: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 170 leaves, 7 steps):

$$-\frac{(3\,A-2\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{(9\,A-5\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B)\,\text{Tan}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(3\,A-B)\,\text{Tan}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1058 leaves):

$$\frac{(-9 A+5 B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[\cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d (a (1+\cos[c+d x]))^{3/2}}+\frac{(9 A-5 B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sin\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d (a (1+\cos[c+d x]))^{3/2}}-$$

$$\frac{\sqrt{2} (3 A-2 B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[\sqrt{2}+2 \sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d (a (1+\cos[c+d x]))^{3/2}}-\frac{i (3 A-2 B) \operatorname{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \sin\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(\sqrt{2}-2 \sin\left[\frac{c}{2}\right]\right)}{d (a (1+\cos[c+d x]))^{3/2} \left(-1+\sqrt{2} \sin\left[\frac{c}{2}\right]\right)}-$$

$$\frac{i (3 A-2 B) \operatorname{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sin\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \sin\left[\frac{c}{4}+\frac{d x}{4}\right]}{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(\sqrt{2}-2 \sin\left[\frac{c}{2}\right]\right)}{d (a (1+\cos[c+d x]))^{3/2} \left(-1+\sqrt{2} \sin\left[\frac{c}{2}\right]\right)}-$$

$$\frac{(3 A-2 B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[2-\sqrt{2} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(\sqrt{2}-2 \sin\left[\frac{c}{2}\right]\right)}{2 d (a (1+\cos[c+d x]))^{3/2} \left(-1+\sqrt{2} \sin\left[\frac{c}{2}\right]\right)}-$$

$$\frac{(3 A-2 B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Log}\left[2+\sqrt{2} \cos\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(\sqrt{2}-2 \sin\left[\frac{c}{2}\right]\right)}{2 d (a (1+\cos[c+d x]))^{3/2} \left(-1+\sqrt{2} \sin\left[\frac{c}{2}\right]\right)}+$$

$$\frac{(A-B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\cos[c+d x]))^{3/2} \left(\cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+\frac{(-A+B) \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\cos[c+d x]))^{3/2} \left(\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sin\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+$$

$$\frac{2 A \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{d (a (1+\cos[c+d x]))^{3/2} \left(\cos\left[\frac{c}{2}+\frac{d x}{2}\right]-\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}-\frac{2 A \cos\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{d (a (1+\cos[c+d x]))^{3/2} \left(\cos\left[\frac{c}{2}+\frac{d x}{2}\right]+\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 114: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(A+B \cos[c+d x]) \sec[c+d x]^3}{(a+a \cos[c+d x])^{3/2}} \, dx$$

Optimal (type 3, 221 leaves, 8 steps):

$$\frac{(19 A-12 B) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right]}{4 a^{3/2} d}-\frac{(13 A-9 B) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{2} \sqrt{a+a \cos[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}-$$

$$\frac{(7 A-6 B) \tan[c+d x]}{4 a d \sqrt{a+a \cos[c+d x]}}-\frac{(A-B) \sec[c+d x] \tan[c+d x]}{2 d (a+a \cos[c+d x])^{3/2}}+\frac{(2 A-B) \sec[c+d x] \tan[c+d x]}{2 a d \sqrt{a+a \cos[c+d x]}}$$

Result (type 3, 1402 leaves):

$$\frac{(13\,A-9\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}}+$$

$$\frac{(-13\,A+9\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}}+\frac{(19\,A-12\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{2\,\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}}+$$

$$\left(\mathrm{i}\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(19\,\sqrt{2}\,A-12\,\sqrt{2}\,B-38\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+24\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{i}\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(19\,\sqrt{2}\,A-12\,\sqrt{2}\,B-38\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+24\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(19\,\sqrt{2}\,A-12\,\sqrt{2}\,B-38\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+24\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(19\,\sqrt{2}\,A-12\,\sqrt{2}\,B-38\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+24\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+\frac{(-A+B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{(A-B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+\frac{A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-5\,A\,\mathrm{Cos}\left[\frac{c}{2}\right]+4\,B\,\mathrm{Cos}\left[\frac{c}{2}\right]+7\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-4\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(5\,A\,\mathrm{Cos}\left[\frac{c}{2}\right]-4\,B\,\mathrm{Cos}\left[\frac{c}{2}\right]+7\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-4\,B\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

### Problem 120: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 164 leaves, 7 steps):

$$\frac{2\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}-\frac{(43\,A-3\,B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}-\frac{(11\,A-3\,B)\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 2334 leaves):

$$-\Bigg(\Bigg(\Bigg((2-2\,i)\,A\,\left(1+e^{i\,c}\right)$$
$$\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+$$
$$(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-$$
$$16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\,x\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])\Bigg)\Bigg/$$
$$\Bigg(\Bigg(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\,\left(-1+e^{i\,c}\right)\,\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2$$
$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\Bigg)\Bigg)-$$

$$\frac{4\,i\,\sqrt{2}\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}+$$

$$\frac{(43\,A-3\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,(B+A\,\mathrm{Sec}[c+d\,x])}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}+$$

$$\frac{(-43\,A+3\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,(B+A\,\mathrm{Sec}[c+d\,x])}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}-$$

$$\frac{2\,\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+A\,\mathrm{Sec}[c+d\,x])}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}+$$

$$\Bigg((1-i)\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])$$
$$\left((1+i)\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-i)\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\,\left((-1-i)\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Bigg/$$

$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left((1+i)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+A\,\mathrm{Sec}[c+d\,x])\right.$$

$$\left.\left((1+i)\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-i)\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\frac{16\,i\,A\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Cos}[c+d\,x]\,\mathrm{Cot}\left[\frac{c}{2}\right]\,(B+A\,\mathrm{Sec}[c+d\,x])}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(8\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\,(B+A\,\mathrm{Sec}[c+d\,x])\right.$$

$$\left.\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{(-A+B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+$$

$$\frac{(-11\,A+3\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{(A-B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])}{8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+$$

$$\frac{(11\,A-3\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]\,(B+A\,\text{Sec}[c+d\,x])}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 121: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 207 leaves, 8 steps):

$$-\frac{(5\,A-2\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}+\frac{(115\,A-43\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-$$
$$\frac{(A-B)\,\text{Tan}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(15\,A-7\,B)\,\text{Tan}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(35\,A-11\,B)\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 632 leaves):

$$\frac{1}{32\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}$$

$$\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(8\,(-115\,A+43\,B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]+8\,(115\,A-43\,B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\right.$$

$$\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]-64\sqrt{2}\,(5\,A-2\,B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-$$

$$\frac{64\,i\,(5\,A-2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}-$$

$$\frac{64\,i\,(5\,A-2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}-\frac{1}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}$$

$$32\,(5\,A-2\,B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)-$$

$$\frac{1}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}32\,(5\,A-2\,B)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^4\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)+$$

$$\left.2\,(67\,A-11\,B+10\,(11\,A-3\,B)\,\text{Cos}[c+d\,x]+(35\,A-11\,B)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 122: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 264 leaves, 9 steps) :

$$\frac{(39\,A-20\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,a^{5/2}\,d}-\frac{(219\,A-115\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{7\,(9\,A-5\,B)\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$

$$\frac{(A-B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(19\,A-11\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(31\,A-15\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 966 leaves) :

$$\frac{(219\,A-115\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+\frac{(-219\,A+115\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+$$

$$\frac{(39\,A-20\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}}+\frac{i\,(39\,A-20\,B)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}+$$

$$\frac{i\,(39\,A-20\,B)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}+$$

$$\frac{(39\,A-20\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}+$$

$$\frac{(39\,A-20\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}+$$

$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}[c+d\,x]^2\,\left(-47\,A\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+51\,B\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-79\,A\,\mathrm{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]+59\,B\,\mathrm{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]-\right.\right.$$
$$\left.\left.127\,A\,\mathrm{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]+75\,B\,\mathrm{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]-63\,A\,\mathrm{Sin}\left[\frac{7\,c}{2}+\frac{7\,d\,x}{2}\right]+35\,B\,\mathrm{Sin}\left[\frac{7\,c}{2}+\frac{7\,d\,x}{2}\right]\right)\right)\Big/\left(64\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\right)$$

- **Problem 123: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])\,(A+B\,\mathrm{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 159 leaves, 8 steps):

$$\frac{2\,a\,(9\,A+7\,B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{15\,d}+\frac{10\,a\,(A+B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+\frac{10\,a\,(A+B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{21\,d}+$$
$$\frac{2\,a\,(9\,A+7\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{45\,d}+\frac{2\,a\,(A+B)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{7\,d}+\frac{2\,a\,B\,\mathrm{Cos}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 914 leaves):

$$a\left(\sqrt{\mathrm{Cos}[c+d\,x]}\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\Bigg(-\frac{(9\,A+7\,B)\,\mathrm{Cot}[c]}{15\,d}+\frac{23\,(A+B)\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{84\,d}+\frac{(18\,A+19\,B)\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{180\,d}+\frac{(A+B)\,\mathrm{Cos}[3\,d\,x]\,\mathrm{Sin}[3\,c]}{28\,d}+\frac{B\,\mathrm{Cos}[4\,d\,x]\,\mathrm{Sin}[4\,c]}{72\,d}+$$

$$\frac{23\,(A+B)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{84\,d}+\frac{(18\,A+19\,B)\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{180\,d}+\frac{(A+B)\,\mathrm{Cos}[3\,c]\,\mathrm{Sin}[3\,d\,x]}{28\,d}+\frac{B\,\mathrm{Cos}[4\,c]\,\mathrm{Sin}[4\,d\,x]}{72\,d}\Bigg)-\frac{1}{21\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}$$

$$5\,A\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\;-$$

$$\frac{1}{21\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}5\,B\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\;-\;\frac{1}{10\,d}3\,A\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\Bigg(\Big(\mathrm{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\Big]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\Big)-$$

$$\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\Bigg)-\frac{1}{30\,d}7\,B\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\Bigg(\Big(\mathrm{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\Big]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\Big)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)\Bigg)$$

- **Problem 124: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 132 leaves, 7 steps):

$$\frac{6\,a\,(A+B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{2\,a\,(7\,A+5\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+$$
$$\frac{2\,a\,(7\,A+5\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,(A+B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a\,B\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 872 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(-\frac{3\,(A+B)\,\text{Cot}[c]}{5\,d}+\frac{(28\,A+23\,B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{84\,d}+\frac{(A+B)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{10\,d}+\right.\right.$$
$$\left.\frac{B\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{28\,d}+\frac{(28\,A+23\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{84\,d}+\frac{(A+B)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{10\,d}+\frac{B\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{28\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 125: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 101 leaves, 6 steps):

$$\frac{2\,a\,(5\,A+3\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{2\,a\,(A+B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}+\frac{2\,a\,(A+B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,a\,B\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 830 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\ (1+\text{Cos}[c+d\,x])\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(-\frac{(5\,A+3\,B)\,\text{Cot}[c]}{5\,d}+\frac{(A+B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{B\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{10\,d}+\frac{(A+B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{B\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{10\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 126: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 70 leaves, 5 steps):

$$\frac{2\,a\,(A+B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{d}+\frac{2\,a\,(3\,A+B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+\frac{2\,a\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 784 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(-\frac{(A+B)\,\text{Cot}[c]}{d}+\frac{B\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{B\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}\right)-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}\right.$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 127: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\ (A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 66 leaves, 5 steps):

$$-\frac{2\,a\,(A-B)\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{d}+\frac{2\,a\,(A+B)\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 783 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\ (1+\text{Cos}[c+d\,x])\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(-\frac{(-2\,A+B+B\,\text{Cos}[2\,c])\ \text{Csc}[c]\ \text{Sec}[c]}{2\,d}+\frac{A\,\text{Sec}[c]\ \text{Sec}[c+d\,x]\ \text{Sin}[d\,x]}{d}\right)-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}\right.$$

$$A\,(1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\Bigg)$$

- **Problem 128: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 95 leaves, 6 steps) :

$$-\frac{2\,a\,(A+B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{d}+\frac{2\,a\,(A+3\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,(A+B)\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 813 leaves) :

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(\frac{(A+B)\,\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+3\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x])}{3\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,+\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

## Problem 129: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 132 leaves, 7 steps):

$$-\frac{2\,a\,(3\,A+5\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{2\,a\,(A+B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,a\,(A+B)\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,(3\,A+5\,B)\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 865 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(\frac{(3\,A+5\,B)\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{5\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,A\,\text{Sin}[c]+5\,A\,\text{Sin}[d\,x]+5\,B\,\text{Sin}[d\,x])}{15\,d}+\right.$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(5\,A\,\text{Sin}[c]+5\,B\,\text{Sin}[c]+9\,A\,\text{Sin}[d\,x]+15\,B\,\text{Sin}[d\,x])}{15\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,+\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 130: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 194 leaves, 8 steps):

$$\frac{4\,a^2\,(9\,A+8\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{4\,a^2\,(6\,A+5\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{4\,a^2\,(6\,A+5\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+$$
$$\frac{4\,a^2\,(9\,A+8\,B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{2\,a^2\,(9\,A+11\,B)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{63\,d}+\frac{2\,B\,\text{Cos}[c+d\,x]^{5/2}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 944 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(-\frac{(9\,A+8\,B)\,\text{Cot}[c]}{15\,d}+\frac{(51\,A+46\,B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{168\,d}+\frac{(36\,A+37\,B)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{360\,d}+\frac{(A+2\,B)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{56\,d}+\frac{B\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{144\,d}+\right.$$
$$\left.\frac{(51\,A+46\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{168\,d}+\frac{(36\,A+37\,B)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{360\,d}+\frac{(A+2\,B)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{56\,d}+\frac{B\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{144\,d}\right)-\frac{1}{7\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$
$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-\frac{1}{10\,d}3\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{15\,d}4\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 131: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 161 leaves, 7 steps):

$$\frac{4\,a^2\,(4\,A+3\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^2\,(7\,A+6\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{4\,a^2\,(7\,A+6\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a^2\,(7\,A+9\,B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{35\,d}+\frac{2\,B\,\text{Cos}[c+d\,x]^{3/2}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 898 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(-\frac{(4\,A+3\,B)\,\text{Cot}[c]}{5\,d}+\frac{(56\,A+51\,B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{168\,d}+\frac{(A+2\,B)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{20\,d}+\frac{B\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{56\,d}+\frac{(56\,A+51\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{168\,d}+\frac{(A+2\,B)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{20\,d}+\frac{B\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{56\,d}\right)-$$

$$\frac{1}{3\,d\sqrt{1+\text{Cot}[c]^2}}A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{7\,d\sqrt{1+\text{Cot}[c]^2}}$$
$$2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{5\,d}2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 132: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\ (A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 126 leaves, 6 steps):

$$\frac{4\,a^2\,(5\,A+4\,B)\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^2\,(2\,A+B)\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+$$
$$\frac{2\,a^2\,(5\,A+7\,B)\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{15\,d}+\frac{2\,B\,\sqrt{\text{Cos}[c+d\,x]}\ \left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 852 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^2\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(-\frac{(5\,A+4\,B)\ \text{Cot}[c]}{5\,d}+\frac{(A+2\,B)\ \text{Cos}[d\,x]\ \text{Sin}[c]}{6\,d}+\frac{B\,\text{Cos}[2\,d\,x]\ \text{Sin}[2\,c]}{20\,d}+\frac{(A+2\,B)\ \text{Cos}[c]\ \text{Sin}[d\,x]}{6\,d}+\frac{B\,\text{Cos}[2\,c]\ \text{Sin}[2\,d\,x]}{20\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d}A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{5\,d}2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 133: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 118 leaves, 6 steps):

$$\frac{4\,a^2\,B\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{d}+\frac{4\,a^2\,(3\,A+2\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-\frac{2\,a^2\,(3\,A-B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 623 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(-\frac{(-A+2\,B+A\,\text{Cos}[2\,c]+2\,B\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{4\,d}+\frac{B\,\text{Cos}[d\,x]\,\text{Sin}[c]}{6\,d}+\frac{B\,\text{Cos}[c]\,\text{Sin}[d\,x]}{6\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{2\,d}\right)-$$

$$\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3\,d\sqrt{1+\text{Cot}[c]^2}}$$

$$2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d}B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 134: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 120 leaves, 6 steps) :

$$-\frac{4 a^2 A \,\text{EllipticE}\left[\frac{1}{2}(c+d x), 2\right]}{d}+\frac{4 a^2 (2 A+3 B) \,\text{EllipticF}\left[\frac{1}{2}(c+d x), 2\right]}{3 d}+\frac{2 a^2 (5 A+3 B) \,\text{Sin}[c+d x]}{3 d \sqrt{\text{Cos}[c+d x]}}+\frac{2 A \left(a^2+a^2 \,\text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{3 d \,\text{Cos}[c+d x]^{3/2}}$$

Result (type 5, 624 leaves) :

$$\sqrt{\text{Cos}[c+d x]} \,(a+a \,\text{Cos}[c+d x])^2 \,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(-\frac{(-4 A-B+B \,\text{Cos}[2 c]) \,\text{Csc}[c] \,\text{Sec}[c]}{4 d}+\frac{A \,\text{Sec}[c] \,\text{Sec}[c+d x]^2 \,\text{Sin}[d x]}{6 d}+\frac{\text{Sec}[c] \,\text{Sec}[c+d x] \,(A \,\text{Sin}[c]+6 A \,\text{Sin}[d x]+3 B \,\text{Sin}[d x])}{6 d}\right)-$$

$$\frac{1}{3 d \sqrt{1+\text{Cot}[c]^2}} 2 A \,(a+a \,\text{Cos}[c+d x])^2 \,\text{Csc}[c] \,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2} \,\text{Sin}[c] \,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{d \sqrt{1+\text{Cot}[c]^2}}$$

$$B \,(a+a \,\text{Cos}[c+d x])^2 \,\text{Csc}[c] \,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \,\text{Sin}[c] \,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2 d} A \,(a+a \,\text{Cos}[c+d x])^2 \,\text{Csc}[c] \,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \,\text{Tan}[c]\right) \Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]} \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]} \sqrt{\text{Cos}[c] \,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}} \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2 \,\text{Cos}[c]^2 \,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c] \,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}}\right)$$

## Problem 135: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 159 leaves, 7 steps):

$$-\frac{4\,a^2\,(4\,A+5\,B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^2\,(A+2\,B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+$$
$$\frac{2\,a^2\,(7\,A+5\,B)\,\mathrm{Sin}[c+d\,x]}{15\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^2\,(4\,A+5\,B)\,\mathrm{Sin}[c+d\,x]}{5\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{2\,A\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}$$

Result (type 5, 883 leaves):

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\frac{(4\,A+5\,B)\,\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{5\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Sin}[d\,x]}{10\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(3\,A\,\mathrm{Sin}[c]+10\,A\,\mathrm{Sin}[d\,x]+5\,B\,\mathrm{Sin}[d\,x])}{30\,d}+\right.$$
$$\left.\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(10\,A\,\mathrm{Sin}[c]+5\,B\,\mathrm{Sin}[c]+24\,A\,\mathrm{Sin}[d\,x]+30\,B\,\mathrm{Sin}[d\,x])}{30\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}$$
$$A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$
$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,-$$
$$\frac{1}{3\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}2\,B\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,+\frac{1}{5\,d}2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},\,-\frac{1}{4}\right\},\,\left\{\frac{3}{4}\right\},\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left(\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 136: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 194 leaves, 8 steps):

$$-\frac{4\,a^2\,(3\,A+4\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^2\,(6\,A+7\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+$$

$$\frac{2\,a^2\,(9\,A+7\,B)\,\text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{4\,a^2\,(6\,A+7\,B)\,\text{Sin}[c+d\,x]}{21\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^2\,(3\,A+4\,B)\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 5, 925 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\frac{(3\,A+4\,B)\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{14\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(5\,A\,\text{Sin}[c]+14\,A\,\text{Sin}[d\,x]+7\,B\,\text{Sin}[d\,x])}{70\,d}+\right.$$

$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(42\,A\,\text{Sin}[c]+21\,B\,\text{Sin}[c]+60\,A\,\text{Sin}[d\,x]+70\,B\,\text{Sin}[d\,x])}{210\,d}+$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(30\,A\,\text{Sin}[c]+35\,B\,\text{Sin}[c]+63\,A\,\text{Sin}[d\,x]+84\,B\,\text{Sin}[d\,x])}{105\,d}\right)-\frac{1}{7\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$2\,A\,(a + a\,\text{Cos}[c + d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x - \text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1 - \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1 + \text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1 + \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]} -$$

$$\frac{1}{3\,d\,\sqrt{1 + \text{Cot}[c]^2}}B\,(a + a\,\text{Cos}[c + d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x - \text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1 - \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1 + \text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1 + \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]} + \frac{1}{10\,d}3\,A\,(a + a\,\text{Cos}[c + d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x + \text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1 - \text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1 + \text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1 + \text{Tan}[c]^2}}\,\sqrt{1 + \text{Tan}[c]^2}\right) -$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}} + \frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1 + \text{Tan}[c]^2}}}\right) + \frac{1}{5\,d}2\,B\,(a + a\,\text{Cos}[c + d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x + \text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1 - \text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1 + \text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1 + \text{Tan}[c]^2}}\,\sqrt{1 + \text{Tan}[c]^2}\right) -$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}} + \frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x + \text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1 + \text{Tan}[c]^2}}}\right)$$

**Problem 137: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 237 leaves, 9 steps):

$$\frac{4\,a^3\,(17\,A+15\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{15\,d}+\frac{4\,a^3\,(121\,A+105\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{231\,d}+\frac{4\,a^3\,(121\,A+105\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{231\,d}+\frac{4\,a^3\,(17\,A+15\,B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{20\,a^3\,(22\,A+21\,B)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{693\,d}+\frac{2\,a\,B\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{11\,d}+\frac{2\,(11\,A+15\,B)\,\text{Cos}[c+d\,x]^{5/2}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{99\,d}$$

Result (type 5, 990 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(17\,A+15\,B)\,\text{Cot}[c]}{30\,d}+\frac{(2134\,A+1953\,B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{7392\,d}+\frac{(73\,A+75\,B)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{720\,d}+\frac{3\,(44\,A+63\,B)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{4928\,d}+\frac{(A+3\,B)\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{288\,d}+\frac{B\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{704\,d}+\frac{(2134\,A+1953\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{7392\,d}+\frac{(73\,A+75\,B)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{720\,d}+\frac{3\,(44\,A+63\,B)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{4928\,d}+\frac{(A+3\,B)\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{288\,d}+\frac{B\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{704\,d}\right)-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$11\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{22\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-\frac{1}{60\,d}17\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},\,-\frac{1}{4}\right\},\,\left\{\frac{3}{4}\right\},\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{4\,d}\text{B}\ (a+a\,\text{Cos}[c+d\,x])^3\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 138: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\ (A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 204 leaves, 8 steps):

$$\frac{4\,a^3\ (21\,A+17\,B)\ \text{EllipticE}\left[\frac{1}{2}\ (c+d\,x),2\right]}{15\,d}+\frac{4\,a^3\ (13\,A+11\,B)\ \text{EllipticF}\left[\frac{1}{2}\ (c+d\,x),2\right]}{21\,d}+$$
$$\frac{4\,a^3\ (13\,A+11\,B)\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{21\,d}+\frac{4\,a^3\ (24\,A+23\,B)\ \text{Cos}[c+d\,x]^{3/2}\ \text{Sin}[c+d\,x]}{105\,d}+$$
$$\frac{2\,a\,B\,\text{Cos}[c+d\,x]^{3/2}\ (a+a\,\text{Cos}[c+d\,x])^2\ \text{Sin}[c+d\,x]}{9\,d}+\frac{2\ (9\,A+13\,B)\ \text{Cos}[c+d\,x]^{3/2}\ \left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\ \text{Sin}[c+d\,x]}{63\,d}$$

Result (type 5, 944 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(21\,A+17\,B)\ \text{Cot}[c]}{30\,d}+\frac{(107\,A+97\,B)\ \text{Cos}[d\,x]\ \text{Sin}[c]}{336\,d}+\right.$$
$$\frac{(54\,A+73\,B)\ \text{Cos}[2\,d\,x]\ \text{Sin}[2\,c]}{720\,d}+\frac{(A+3\,B)\ \text{Cos}[3\,d\,x]\ \text{Sin}[3\,c]}{112\,d}+\frac{B\,\text{Cos}[4\,d\,x]\ \text{Sin}[4\,c]}{288\,d}+\frac{(107\,A+97\,B)\ \text{Cos}[c]\ \text{Sin}[d\,x]}{336\,d}+$$

$$\frac{(54\,A + 73\,B)\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{720\,d} + \frac{(A + 3\,B)\,\mathrm{Cos}[3\,c]\,\mathrm{Sin}[3\,d\,x]}{112\,d} + \frac{B\,\mathrm{Cos}[4\,c]\,\mathrm{Sin}[4\,d\,x]}{288\,d}\Bigg) - \frac{1}{42\,d\,\sqrt{1 + \mathrm{Cot}[c]^2}}$$

$$13\,A\,(a + a\,\mathrm{Cos}[c + d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6\,\mathrm{Sec}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1 - \mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1 + \mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1 + \mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]} -$$

$$\frac{1}{42\,d\,\sqrt{1 + \mathrm{Cot}[c]^2}}\,11\,B\,(a + a\,\mathrm{Cos}[c + d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]$$

$$\mathrm{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6\,\mathrm{Sec}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1 - \mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1 + \mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1 + \mathrm{Sin}[d\,x - \mathrm{ArcTan}[\mathrm{Cot}[c]]]} - \frac{1}{20\,d}\,7\,A\,(a + a\,\mathrm{Cos}[c + d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6$$

$$\Bigg(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\,\mathrm{Sin}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1 - \mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1 + \mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1 + \mathrm{Tan}[c]^2}}\,\sqrt{1 + \mathrm{Tan}[c]^2}\right) -$$

$$\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}} + \frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1 + \mathrm{Tan}[c]^2}}}\Bigg) - \frac{1}{60\,d}\,17\,B\,(a + a\,\mathrm{Cos}[c + d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6$$

$$\Bigg(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\,\mathrm{Sin}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1 - \mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1 + \mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x + \mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1 + \mathrm{Tan}[c]^2}}\,\sqrt{1 + \mathrm{Tan}[c]^2}\right) -$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 139: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 171 leaves, 7 steps):

$$\frac{4\,a^3\,(9\,A+7\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^3\,(21\,A+13\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+\frac{4\,a^3\,(42\,A+41\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d}+\frac{2\,a\,B\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,(7\,A+11\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{35\,d}$$

Result (type 5, 898 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(9\,A+7\,B)\,\text{Cot}[c]}{10\,d}+\frac{(84\,A+107\,B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{336\,d}+\frac{(A+3\,B)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{40\,d}+\frac{B\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{112\,d}+\frac{(84\,A+107\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{336\,d}+\frac{(A+3\,B)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{40\,d}+\frac{B\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{112\,d}\right)-$$
$$\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$13\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20\,d}9\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{20\,d}7\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 140: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 169 leaves, 7 steps):

$$\frac{4\,a^3\,(5\,A+9\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(5\,A+3\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-\frac{4\,a^3\,(5\,A-6\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+$$
$$\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{2\,(5\,A-B)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 888 leaves):

$$\sqrt{\mathrm{Cos}[c+d\,x]}\;(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(5\,A+18\,B+15\,A\,\mathrm{Cos}[2\,c]+18\,B\,\mathrm{Cos}[2\,c])\,\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{40\,d}+\frac{(A+3\,B)\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{12\,d}+\frac{B\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{40\,d}+\frac{(A+3\,B)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{12\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{4\,d}+\frac{B\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{40\,d}\right)-$$

$$\frac{1}{6\,d\sqrt{1+\mathrm{Cot}[c]^2}}5\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]$$
$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-\frac{1}{2\,d\sqrt{1+\mathrm{Cot}[c]^2}}$$
$$B\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-\frac{1}{4\,d}A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)-\frac{1}{20\,d}9\,B\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 141: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 161 leaves, 7 steps):

$$-\frac{4\,a^3\,(A-B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{d}+\frac{20\,a^3\,(A+B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}-$$
$$\frac{4\,a^3\,(4\,A+B)\,\sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{3\,d}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,(7\,A+3\,B)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 879 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(-5\,A+B+A\,\text{Cos}[2\,c]+3\,B\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{8\,d}+\frac{B\,\text{Cos}[d\,x]\,\text{Sin}[c]}{12\,d}+\frac{B\,\text{Cos}[c]\,\text{Sin}[d\,x]}{12\,d}+\right.$$
$$\left.\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{12\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+9\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x])}{12\,d}\right)-\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$5\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{4\,d}A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{4\,d}B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 142: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 171 leaves, 7 steps):

$$-\frac{4\,a^3\,(9\,A+5\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(3\,A+5\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}+$$

$$\frac{4\,a^3\,(21\,A+20\,B)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,(9\,A+5\,B)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 5, 890 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(-36\,A-25\,B+5\,B\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{40\,d}+\right.$$

$$\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{20\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,A\,\text{Sin}[c]+15\,A\,\text{Sin}[d\,x]+5\,B\,\text{Sin}[d\,x])}{60\,d}+$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(15\,A\,\text{Sin}[c]+5\,B\,\text{Sin}[c]+54\,A\,\text{Sin}[d\,x]+45\,B\,\text{Sin}[d\,x])}{60\,d}\right)-\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -$$

$$\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ +\frac{1}{20\,d}9\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{4\,d}B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

## ■ Problem 143: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\ (A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 204 leaves, 8 steps):

$$-\frac{4\,a^3\ (7\,A+9\,B)\ \text{EllipticE}\left[\frac{1}{2}\ (c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^3\ (13\,A+21\,B)\ \text{EllipticF}\left[\frac{1}{2}\ (c+d\,x),\,2\right]}{21\,d}+\frac{4\,a^3\ (41\,A+42\,B)\ \text{Sin}[c+d\,x]}{105\,d\,\text{Cos}[c+d\,x]^{3/2}}+$$

$$\frac{4\,a^3\ (7\,A+9\,B)\ \text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,a\,A\ (a+a\,\text{Cos}[c+d\,x])^2\ \text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\ (11\,A+7\,B)\ \left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\ \text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}}$$

Result (type 5, 925 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\frac{(7\,A+9\,B)\ \text{Csc}[c]\ \text{Sec}[c]}{10\,d}+\frac{A\,\text{Sec}[c]\ \text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{28\,d}+\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]^3\ (5\,A\,\text{Sin}[c]+21\,A\,\text{Sin}[d\,x]+7\,B\,\text{Sin}[d\,x])}{140\,d}+\right.$$

$$\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]^2\ (63\,A\,\text{Sin}[c]+21\,B\,\text{Sin}[c]+130\,A\,\text{Sin}[d\,x]+105\,B\,\text{Sin}[d\,x])}{420\,d}+$$

$$\left.\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]\ (130\,A\,\text{Sin}[c]+105\,B\,\text{Sin}[c]+294\,A\,\text{Sin}[d\,x]+378\,B\,\text{Sin}[d\,x])}{420\,d}\right)-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$13\,A\ (a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -$$

$$\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}B\ (a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{20\,d}7\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}9\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 144: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 237 leaves, 9 steps) :

$$-\frac{4 a^3 (17 A+21 B) \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{15 d}+\frac{4 a^3 (11 A+13 B) \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{21 d}+\frac{4 a^3 (23 A+24 B) \text{Sin}[c+d x]}{105 d \text{Cos}[c+d x]^{5/2}}+\frac{4 a^3 (11 A+13 B) \text{Sin}[c+d x]}{21 d \text{Cos}[c+d x]^{3/2}}+\frac{4 a^3 (17 A+21 B) \text{Sin}[c+d x]}{15 d \sqrt{\text{Cos}[c+d x]}}+\frac{2 a A (a+a \text{Cos}[c+d x])^2 \text{Sin}[c+d x]}{9 d \text{Cos}[c+d x]^{9/2}}+\frac{2 (13 A+9 B) \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{63 d \text{Cos}[c+d x]^{7/2}}$$

Result (type 5, 967 leaves) :

$$\sqrt{\text{Cos}[c+d x]} (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(\frac{(17 A+21 B) \text{Csc}[c] \text{Sec}[c]}{30 d}+\frac{A \text{Sec}[c] \text{Sec}[c+d x]^5 \text{Sin}[d x]}{36 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x]^4 (7 A \text{Sin}[c]+27 A \text{Sin}[d x]+9 B \text{Sin}[d x])}{252 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x] (55 A \text{Sin}[c]+65 B \text{Sin}[c]+119 A \text{Sin}[d x]+147 B \text{Sin}[d x])}{210 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x]^3 (135 A \text{Sin}[c]+45 B \text{Sin}[c]+238 A \text{Sin}[d x]+189 B \text{Sin}[d x])}{1260 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x]^2 (238 A \text{Sin}[c]+189 B \text{Sin}[c]+330 A \text{Sin}[d x]+390 B \text{Sin}[d x])}{1260 d}\right)-$$

$$\frac{1}{42 d \sqrt{1+\text{Cot}[c]^2}} 11 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{42 d \sqrt{1+\text{Cot}[c]^2}}$$

$$13 B (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{60 d} 17 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}7\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\;\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 145: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 156 leaves, 6 steps):

$$-\frac{3\,(5\,A-7\,B)\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a\,d}+\frac{5\,(A-B)\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+$$

$$\frac{5\,(A-B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,a\,d}-\frac{(5\,A-7\,B)\;\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}+\frac{(A-B)\;\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1182 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\;\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i e^{2 i d x}\operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3 i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i e^{2 i d x}\operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{20\,(a+a\operatorname{Cos}[c+d x])}21\, i\, B\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\operatorname{Csc}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2 e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i e^{2 i d x}\operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3 i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i e^{2 i d x}\operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)\Bigg)+\frac{1}{a+a\operatorname{Cos}[c+d x]}$$

$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\operatorname{Cos}[c+d x]}\left(\frac{2\,(5 A-5 B+10 A\operatorname{Cos}[c]-16 B\operatorname{Cos}[c])\operatorname{Csc}[c]}{5 d}+\frac{4\,(A-B)\operatorname{Cos}[d x]\operatorname{Sin}[c]}{3 d}+\frac{2 B\operatorname{Cos}[2 d x]\operatorname{Sin}[2 c]}{5 d}+\right.$$

$$\left.\frac{2\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\operatorname{Sin}\left[\frac{d x}{2}\right]-B\operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\frac{4\,(A-B)\operatorname{Cos}[c]\operatorname{Sin}[d x]}{3 d}+\frac{2 B\operatorname{Cos}[2 c]\operatorname{Sin}[2 d x]}{5 d}\right)-$$

$$\Bigg(5 A\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\operatorname{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\sqrt{-\sqrt{1+\operatorname{Cot}[c]^2}\operatorname{Sin}[c]\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/ \left(3 d\,(a+a\operatorname{Cos}[c+d x])\sqrt{1+\operatorname{Cot}[c]^2}\right)+$$

$$\Bigg(5 B\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\operatorname{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\sqrt{-\sqrt{1+\operatorname{Cot}[c]^2}\operatorname{Sin}[c]\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 146: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 123 leaves, 5 steps):

$$\frac{3\,(A-B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}-\frac{(3\,A-5\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a\,d}-\frac{(3\,A-5\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d}+\frac{(A-B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1129 leaves):

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+$$
$$\frac{1}{a+a\,\text{Cos}[c+d\,x]}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\sqrt{\text{Cos}[c+d\,x]}\,\left(-\frac{2\,(A-B)\,(1+2\,\text{Cos}[c])\,\text{Csc}[c]}{d}+\frac{4\,B\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}-\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{4\,B\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}\right)+$$

$$\left(A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1+\operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right) \Big/$$
$$\left(d (a + a \operatorname{Cos}[c+d x]) \sqrt{1+\operatorname{Cot}[c]^2}\right) - \left(5 B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\right.$$
$$\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1-\operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$
$$\left.\sqrt{1+\operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right) \Big/ \left(3 d (a + a \operatorname{Cos}[c+d x]) \sqrt{1+\operatorname{Cot}[c]^2}\right)$$

- **Problem 147: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]} (A + B \operatorname{Cos}[c+d x])}{a + a \operatorname{Cos}[c+d x]} \, dx$$

Optimal (type 4, 85 leaves, 4 steps):

$$-\frac{(A-3 B) \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{a d} + \frac{(A-B) \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{a d} + \frac{(A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{d (a + a \operatorname{Cos}[c+d x])}$$

Result (type 5, 1098 leaves):

$$-\frac{1}{4 (a + a \operatorname{Cos}[c+d x])} i A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right) -$$
$$\left(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c] + d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\right) + \frac{1}{4 (a + a \operatorname{Cos}[c+d x])} 3 i B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2$$
$$\operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right] \left(\left(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right) -$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\text{Cos}[c+d x]}\left(-\frac{2(-A+B+2 B\,\text{Cos}[c])\,\text{Csc}[c]}{d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}\right)}{a+a\,\text{Cos}[c+d x]}-$$

$$\left(A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 148: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d x]}{\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])}\,dx$$

Optimal (type 4, 83 leaves, 4 steps):

$$\frac{(A-B)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a\,d}+\frac{(A+B)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{a\,d}-\frac{(A-B)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{d\,(a+a\,\text{Cos}[c+d x])}$$

Result (type 5, 1094 leaves):

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d x])}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\Bigg)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\text{Cos}[c+d\,x]}\left(-\frac{2\,(A-B)\,\text{Csc}[c]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}\right)}{a+a\,\text{Cos}[c+d\,x]}-$$

$$\Bigg(A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\Bigg)\Bigg/\left(d\,(a+a\,\text{Cos}[c+d\,x])\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\Bigg(B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\Bigg)\Bigg/\left(d\,(a+a\,\text{Cos}[c+d\,x])\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 149: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 119 leaves, 5 steps):

$$-\frac{(3A-B)\,\text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]}{a\,d}-\frac{(A-B)\,\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]}{a\,d}+\frac{(3A-B)\,\text{Sin}[c+dx]}{a\,d\,\sqrt{\text{Cos}[c+dx]}}-\frac{(A-B)\,\text{Sin}[c+dx]}{d\,\sqrt{\text{Cos}[c+dx]}\,(a+a\,\text{Cos}[c+dx])}$$

Result (type 5, 1130 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+dx])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2idx}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2idx}\right)\text{Cos}[c]-3\,d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2idx}\right)\text{Cos}[c]+d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)\right)+\frac{1}{4\,(a+a\,\text{Cos}[c+dx])}i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2idx}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2idx}\right)\text{Cos}[c]-3\,d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2idx}\right)\text{Cos}[c]+d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)\right)+$$
$$\frac{1}{a+a\,\text{Cos}[c+dx]}\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\sqrt{\text{Cos}[c+dx]}\left(\frac{(2A+A\,\text{Cos}[c]-B\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}+\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(A\,\text{Sin}\left[\frac{dx}{2}\right]-B\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{d}+\frac{4\,A\,\text{Sec}[c]\,\text{Sec}[c+dx]\,\text{Sin}[dx]}{d}\right)+$$
$$\left(A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[dx-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+dx])\,\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$
$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\,\sqrt{1+\mathrm{Cot}[c]^2}\right)$$

- **Problem 150: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 153 leaves, 6 steps):

$$\frac{3\,(A-B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{(5\,A-3\,B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+$$
$$\frac{(5\,A-3\,B)\,\mathrm{Sin}[c+d\,x]}{3\,a\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}-\frac{3\,(A-B)\,\mathrm{Sin}[c+d\,x]}{a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 5, 1167 leaves):

$$\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}3\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-$$
$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)\right)-\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}3\,i\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-$$
$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)\right)+\frac{1}{a+a\,\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\left(-\frac{(A-B)\,(2+\mathrm{Cos}[c])\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[c]}{d}-\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{4\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(A\,\mathrm{Sin}[c]-3\,A\,\mathrm{Sin}[d\,x]+3\,B\,\mathrm{Sin}[d\,x])}{3\,d}\right)-$$

$$\left(5\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])\sqrt{1+\mathrm{Cot}[c]^2}\right)+\left(B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\right.$$

$$\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\sqrt{1+\mathrm{Cot}[c]^2}\right)$$

- **Problem 151: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{7/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 203 leaves, 7 steps) :

$$-\frac{7\,(5\,A-8\,B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a^2\,d}+\frac{5\,(2\,A-3\,B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a^2\,d}+\frac{5\,(2\,A-3\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d}-$$
$$\frac{7\,(5\,A-8\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{15\,a^2\,d}+\frac{(2\,A-3\,B)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(A-B)\,\mathrm{Cos}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 5, 1262 leaves) :

$$-\frac{1}{2\,(a+a\,\mathrm{Cos}[c+d\,x])^2}7\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{5\,(a+a\,\text{Cos}[c+d\,x])^2}28\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\Bigg)-$$

$$\left(20\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(10\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{4\,(15\,A-20\,B+20\,A\,\text{Cos}[c]-36\,B\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}+\frac{8\,(A-2\,B)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{4\,B\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{5\,d}+\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-4\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+$$

$$\frac{8\,(A-2B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{4\,B\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{5\,d}-\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\Bigg)$$

- **Problem 152: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 166 leaves, 6 steps):

$$\frac{(4\,A-7\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a^2\,d}-\frac{5\,(A-2\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a^2\,d}-$$
$$\frac{5\,(A-2\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,d}+\frac{(4\,A-7\,B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}+\frac{(A-B)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1218 leaves):

$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Bigg/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Bigg/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\Bigg)-\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}7\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Bigg/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Bigg/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\Bigg)+$$
$$\Bigg(10\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(20\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(2\,A-3\,B+2\,A\,\text{Cos}[c]-4\,B\,\text{Cos}[c])\,\text{Csc}[c]}{d}+\frac{8\,B\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(2\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-3\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{8\,B\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 153: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 136 leaves, 5 steps):

$$-\frac{(A-4\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a^2\,d}+\frac{(2\,A-5\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a^2\,d}+$$

$$\frac{(2\,A-5\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}+\frac{(A-B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1184 leaves):

$$-\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)+\frac{1}{(a+a \operatorname{Cos}[c+d x])^2} 2 i B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]\Bigg(\Bigg(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3 i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\Bigg(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-$$

$$\Bigg(4 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/ \left(3 d(a+a \operatorname{Cos}[c+d x])^2 \sqrt{1+\operatorname{Cot}[c]^2}\right)+$$

$$\Bigg(10 B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/$$

$$\left(3 d(a+a \operatorname{Cos}[c+d x])^2 \sqrt{1+\operatorname{Cot}[c]^2}\right)+\frac{1}{(a+a \operatorname{Cos}[c+d x])^2} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \sqrt{\operatorname{Cos}[c+d x]}$$

$$\left(-\frac{4(-A+2 B+2 B \operatorname{Cos}[c]) \operatorname{Csc}[c]}{d}+\frac{4 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A \operatorname{Sin}\left[\frac{d x}{2}\right]-2 B \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{d}-\right.$$

$$\left.\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(A \operatorname{Sin}\left[\frac{d x}{2}\right]-B \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{3 d}-\frac{2(A-B) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 154: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]}\,(A+B \operatorname{Cos}[c+d x])}{(a+a \operatorname{Cos}[c+d x])^2}\, dx$$

Optimal (type 4, 121 leaves, 5 steps) :

$$-\frac{B\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}+\frac{(A+2\,B)\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a^2\,d}+\frac{B\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}+\frac{(A-B)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 815 leaves):

$$-\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)-$$
$$\left(2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(4\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$
$$\left(\frac{4\,B\,\text{Csc}[c]}{d}+\frac{4\,B\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 155: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 121 leaves, 5 steps):

$$\frac{A\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}+\frac{(2A+B)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3a^2 d}-\frac{A\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{a^2 d\,(1+\text{Cos}[c+d x])}-\frac{(A-B)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3d\,(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 815 leaves):

$$\frac{1}{2(a+a\,\text{Cos}[c+d x])^2}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-$$
$$\left(4A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(2B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(3d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\sqrt{\text{Cos}[c+d x]}$$
$$\left(-\frac{4A\,\text{Csc}[c]}{d}-\frac{4A\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{3d}-\frac{2(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3d}\right)$$

## Problem 156: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{A + B \operatorname{Cos}[c + d x]}{\operatorname{Cos}[c + d x]^{3/2} (a + a \operatorname{Cos}[c + d x])^2} \, dx$$

Optimal (type 4, 168 leaves, 6 steps):

$$-\frac{(4 A - B) \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right]}{a^2 d} - \frac{(5 A - 2 B) \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right]}{3 a^2 d} + \frac{(4 A - B) \operatorname{Sin}[c + d x]}{a^2 d \sqrt{\operatorname{Cos}[c + d x]}} - \frac{(5 A - 2 B) \operatorname{Sin}[c + d x]}{3 a^2 d \sqrt{\operatorname{Cos}[c + d x]} (1 + \operatorname{Cos}[c + d x])} - \frac{(A - B) \operatorname{Sin}[c + d x]}{3 d \sqrt{\operatorname{Cos}[c + d x]} (a + a \operatorname{Cos}[c + d x])^2}$$

Result (type 5, 1217 leaves):

$$-\frac{1}{(a + a \operatorname{Cos}[c + d x])^2} 2 i A \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2 e^{2 i d x} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right) -$$
$$\left(2 \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)\right) + \frac{1}{2 (a + a \operatorname{Cos}[c + d x])^2} i B \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^4$$
$$\operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right] \left(\left(2 e^{2 i d x} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right) -$$
$$\left(2 \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)\right) +$$
$$\left(10 A \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]\right.$$
$$\sqrt{1 - \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1 + \operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$
$$\left.\sqrt{1 + \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right) \Big/ \left(3 d (a + a \operatorname{Cos}[c + d x])^2 \sqrt{1 + \operatorname{Cot}[c]^2}\right) -$$

$$\left(4\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{2\,(2\,A+2\,A\,\text{Cos}[c]-B\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]}{d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\left.\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(2\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{8\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}+\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 157: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 201 leaves, 7 steps):

$$\frac{(7\,A-4\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a^2\,d}+\frac{5\,(2\,A-B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a^2\,d}+\frac{5\,(2\,A-B)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}-$$

$$\frac{(7\,A-4\,B)\,\text{Sin}[c+d\,x]}{a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{(7\,A-4\,B)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B)\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1258 leaves):

$$\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}7\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.\right.$$

$$\sqrt{1+e^{2 i d x}\text{Cos}[2 c]+i e^{2 i d x}\text{Sin}[2 c]}\Bigg) \Big/ \left(3 i d \left(1+e^{2 i d x}\right)\text{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\text{Cos}[2 c]+i e^{2 i d x}\text{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(20\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg) \Big/ \left(3 d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\Bigg(10\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg) \Big/$$

$$\left(3 d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\sqrt{\text{Cos}[c+d x]}$$

$$\left(-\frac{2\,(4 A-2 B+3 A\,\text{Cos}[c]-2 B\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(3 A\,\text{Sin}\left[\frac{d x}{2}\right]-2 B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}-\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{3 d}+\frac{8 A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{3 d}+$$

$$\left.\frac{8\,\text{Sec}[c]\,\text{Sec}[c+d x]\,(A\,\text{Sin}[c]-6 A\,\text{Sin}[d x]+3 B\,\text{Sin}[d x])}{3 d}-\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 158: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{9/2}\,(A+B\,\text{Cos}[c+d x])}{(a+a\,\text{Cos}[c+d x])^3}\,dx$$

Optimal (type 4, 254 leaves, 8 steps) :

$$-\frac{7\,(17A-33B)\,\text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]}{10a^3d}+\frac{(11A-21B)\,\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]}{2a^3d}+$$
$$\frac{(11A-21B)\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{2a^3d}-\frac{7\,(17A-33B)\,\text{Cos}[c+dx]^{3/2}\,\text{Sin}[c+dx]}{30a^3d}+$$
$$\frac{(A-B)\,\text{Cos}[c+dx]^{9/2}\,\text{Sin}[c+dx]}{5d\,(a+a\,\text{Cos}[c+dx])^3}+\frac{(7A-12B)\,\text{Cos}[c+dx]^{7/2}\,\text{Sin}[c+dx]}{15ad\,(a+a\,\text{Cos}[c+dx])^2}+\frac{3\,(11A-21B)\,\text{Cos}[c+dx]^{5/2}\,\text{Sin}[c+dx]}{10d\left(a^3+a^3\,\text{Cos}[c+dx]\right)}$$

Result (type 5, 1346 leaves):

$$-\frac{1}{10\,(a+a\,\text{Cos}[c+dx])^3}119\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2idx}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(3id\left(1+e^{2idx}\right)\text{Cos}[c]-3d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(-id\left(1+e^{2idx}\right)\text{Cos}[c]+d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)\right)+$$
$$\frac{1}{10\,(a+a\,\text{Cos}[c+dx])^3}231\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2idx}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(3id\left(1+e^{2idx}\right)\text{Cos}[c]-3d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2idx}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-idx}\left(2\left(1+e^{2idx}\right)\text{Cos}[c]+2i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2idx}\,\text{Cos}[2c]+i\,e^{2idx}\,\text{Sin}[2c]}\right)\Big/\left(-id\left(1+e^{2idx}\right)\text{Cos}[c]+d\left(-1+e^{2idx}\right)\text{Sin}[c]\right)\right)-$$
$$\left(22\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[dx-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+dx])^3\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(42\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\sqrt{1+\mathrm{Cot}[c]^2}\right)+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\left(\frac{4\,(59\,A-99\,B+60\,A\,\mathrm{Cos}[c]-132\,B\,\mathrm{Cos}[c])\,\mathrm{Csc}[c]}{5\,d}+\frac{16\,(A-3\,B)\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{3\,d}+\frac{8\,B\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{5\,d}+\right.$$

$$\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(59\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-99\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(19\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-24\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+$$

$$\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{16\,(A-3\,B)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{3\,d}+$$

$$\left.\frac{8\,B\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{5\,d}-\frac{4\,(19\,A-24\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 159: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{7/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 219 leaves, 7 steps):

$$\frac{7\,(7\,A-17\,B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}-\frac{(13\,A-33\,B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}-\frac{(13\,A-33\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{6\,a^3\,d}+$$

$$\frac{(A-B)\,\mathrm{Cos}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{(A-2\,B)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{3\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{7\,(7\,A-17\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{30\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 5, 1306 leaves):

$$\frac{1}{10\,(a+a\,\mathrm{Cos}[c+d\,x])^3}49\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d x])^3}119\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\left(26\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(22\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Cos}[c+d x]}$$

$$\left(-\frac{4\,(29\,A-59\,B+20\,A\,\text{Cos}[c]-60\,B\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}+\frac{16\,B\,\text{Cos}[d x]\,\text{Sin}[c]}{3\,d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(29\,A\,\text{Sin}\left[\frac{d x}{2}\right]-59\,B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5\,d}+\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(14\,A\,\text{Sin}\left[\frac{d x}{2}\right]-19\,B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{15\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5\,d}+$$

$$\frac{16\,B\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{4\,(14\,A-19\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\Bigg)$$

- **Problem 160: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 188 leaves, 6 steps):

$$-\frac{(9\,A-49\,B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(3\,A-13\,B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}+$$
$$\frac{(A-B)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{(3\,A-8\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{(3\,A-13\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 5, 1273 leaves):

$$-\frac{1}{10\,(a+a\,\mathrm{Cos}[c+d\,x])^3}9\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$
$$\Bigg(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)\Bigg)+$$
$$\frac{1}{10\,(a+a\,\mathrm{Cos}[c+d\,x])^3}49\,i\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$
$$\Bigg(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)\Bigg)-$$
$$\Bigg(2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right) \Big/ \left(d\ (a+a\,\text{Cos}[c+d\,x])^3\ \sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(26\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\ \text{Csc}\left[\frac{c}{2}\right]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}\right]\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\ (a+a\,\text{Cos}[c+d\,x])^3\ \sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{4\ (-9\,A+29\,B+20\,B\,\text{Cos}[c])\ \text{Csc}[c]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\ \left(9\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-29\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\ \left(9\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-14\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\ \left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-$$

$$\left.\frac{4\ (9\,A-14\,B)\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\ \text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\ (A-B)\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\ \text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 161: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\ (A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 180 leaves, 6 steps):

$$-\frac{(A+9\,B)\ \text{EllipticE}\left[\frac{1}{2}\ (c+d\,x),2\right]}{10\,a^3\,d}+\frac{(A+3\,B)\ \text{EllipticF}\left[\frac{1}{2}\ (c+d\,x),2\right]}{6\,a^3\,d}+$$

$$\frac{(A-B)\ \text{Cos}[c+d\,x]^{3/2}\ \text{Sin}[c+d\,x]}{5\,d\ (a+a\,\text{Cos}[c+d\,x])^3}+\frac{(A-6\,B)\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{15\,a\,d\ (a+a\,\text{Cos}[c+d\,x])^2}+\frac{(A+9\,B)\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{10\,d\ \left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1265 leaves):

$$-\frac{1}{10\ (a+a\,\text{Cos}[c+d\,x])^3}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\ \text{Csc}\left[\frac{c}{2}\right]\ \text{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\Bigg)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\Bigg)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d x])^3}9\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\Bigg)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\Bigg)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-$$

$$\Bigg(2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\Bigg(2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\sqrt{\text{Cos}[c+d x]}$$

$$\left(\frac{4\,(A+9\,B)\,\mathrm{Csc}[c]}{5\,d}+\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(4\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-9\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}-\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$

$$\left.\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+9\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,(4\,A-9\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 162: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]\right)}{\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^3}\,dx$$

Optimal (type 4, 178 leaves, 6 steps):

$$\frac{(A-B)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{10\,a^3\,d}+\frac{(A+B)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{6\,a^3\,d}+$$

$$\frac{(A-B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^3}+\frac{(A+4\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^2}-\frac{(A-B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 5, 1264 leaves):

$$\frac{1}{10\,\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^3}\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,\left(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c]\right)^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$

$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,\left(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c]\right)^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)\right)-\frac{1}{10\,\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^3}\,i\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,\left(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c]\right)^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$

$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,\left(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c]\right)^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)\right)-$$

$$\left(2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$
$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/ \left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\sqrt{1+\mathrm{Cot}[c]^2}\right) -$$
$$\left(2\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/$$
$$\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\sqrt{1+\mathrm{Cot}[c]^2}\right) + \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\left(-\frac{4\,(A-B)\,\mathrm{Csc}[c]}{5\,d} - \frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d} + \frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d} + \right.$$
$$\left.\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+4\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d} + \frac{4\,(A+4\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d} + \frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 163: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 182 leaves, 6 steps):

$$\frac{(9\,A+B)\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d} + \frac{(3\,A+B)\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{6\,a^3\,d} -$$
$$\frac{(A-B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3} - \frac{(6\,A-B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2} - \frac{(9\,A+B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 5, 1265 leaves):

$$\frac{1}{10\,(a+a\,\mathrm{Cos}[c+d\,x])^3}9\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\,\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\Big]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\,\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\Bigg)+\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,i\,B\,\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\text{Csc}\Big[\frac{c}{2}\Big]\,\text{Sec}\Big[\frac{c}{2}\Big]\,\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\Big]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\,\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\Big]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\,\Bigg)\Bigg/\,\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\Bigg)-$$

$$\Bigg(2\,A\,\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\text{Csc}\Big[\frac{c}{2}\Big]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\,\frac{1}{2}\Big\},\,\Big\{\frac{5}{4}\Big\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}\Big]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\Bigg)\Bigg/\,\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\,\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\Bigg(2\,B\,\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\text{Csc}\Big[\frac{c}{2}\Big]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\,\frac{1}{2}\Big\},\,\Big\{\frac{5}{4}\Big\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}\Big]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\Bigg)\Bigg/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^3\,\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\Bigg(-\frac{4\,(9\,A+B)\,\text{Csc}[c]}{5\,d}-\frac{2\,\text{Sec}\big[\frac{c}{2}\big]\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^5\,\big(A\,\text{Sin}\big[\frac{d\,x}{2}\big]-B\,\text{Sin}\big[\frac{d\,x}{2}\big]\big)}{5\,d}-\frac{4\,\text{Sec}\big[\frac{c}{2}\big]\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3\,\big(6\,A\,\text{Sin}\big[\frac{d\,x}{2}\big]-B\,\text{Sin}\big[\frac{d\,x}{2}\big]\big)}{15\,d}-$$

$$\frac{4\,\text{Sec}\big[\frac{c}{2}\big]\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]\,\big(9\,A\,\text{Sin}\big[\frac{d\,x}{2}\big]+B\,\text{Sin}\big[\frac{d\,x}{2}\big]\big)}{5\,d}-\frac{4\,(6\,A-B)\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^2\,\text{Tan}\big[\frac{c}{2}\big]}{15\,d}-\frac{2\,(A-B)\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^4\,\text{Tan}\big[\frac{c}{2}\big]}{5\,d}\Bigg)$$

- **Problem 164: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + B\,\text{Cos}[c + d\,x]}{\text{Cos}[c + d\,x]^{3/2}\,(a + a\,\text{Cos}[c + d\,x])^3}\,dx$$

Optimal (type 4, 221 leaves, 7 steps):

$$-\frac{(49\,A - 9\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c + d\,x),\,2\right]}{10\,a^3\,d} - \frac{(13\,A - 3\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c + d\,x),\,2\right]}{6\,a^3\,d} + \frac{(49\,A - 9\,B)\,\text{Sin}[c + d\,x]}{10\,a^3\,d\,\sqrt{\text{Cos}[c + d\,x]}} - \frac{(A - B)\,\text{Sin}[c + d\,x]}{5\,d\,\sqrt{\text{Cos}[c + d\,x]}\,(a + a\,\text{Cos}[c + d\,x])^3} - \frac{(8\,A - 3\,B)\,\text{Sin}[c + d\,x]}{15\,a\,d\,\sqrt{\text{Cos}[c + d\,x]}\,(a + a\,\text{Cos}[c + d\,x])^2} - \frac{(13\,A - 3\,B)\,\text{Sin}[c + d\,x]}{6\,d\,\sqrt{\text{Cos}[c + d\,x]}\,\left(a^3 + a^3\,\text{Cos}[c + d\,x]\right)}$$

Result (type 5, 1305 leaves):

$$-\frac{1}{10\,(a + a\,\text{Cos}[c + d\,x])^3}49\,i\,A\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\left(2\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] + 2\,i\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(3\,i\,d\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] - 3\,d\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right) -$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\left(2\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] + 2\,i\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(-i\,d\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] + d\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right) +$$
$$\frac{1}{10\,(a + a\,\text{Cos}[c + d\,x])^3}9\,i\,B\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\left(2\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] + 2\,i\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(3\,i\,d\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] - 3\,d\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right) -$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\left(2\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] + 2\,i\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(-i\,d\left(1 + e^{2\,i\,d\,x}\right)\text{Cos}[c] + d\left(-1 + e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right) +$$
$$\left(26\,A\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x - \text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1 - \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1 + \text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{2\,(20\,A+29\,A\,\text{Cos}[c]-9\,B\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(29\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(11\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-6\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+$$

$$\left.\frac{16\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}+\frac{4\,(11\,A-6\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 165: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 254 leaves, 8 steps):

$$\frac{7\,(17\,A-7\,B)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(33\,A-13\,B)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}+\frac{(33\,A-13\,B)\,\text{Sin}[c+d\,x]}{6\,a^3\,d\,\text{Cos}[c+d\,x]^{3/2}}-\frac{7\,(17\,A-7\,B)\,\text{Sin}[c+d\,x]}{10\,a^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{(A-B)\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(2\,A-B)\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{7\,(17\,A-7\,B)\,\text{Sin}[c+d\,x]}{30\,d\,\text{Cos}[c+d\,x]^{3/2}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1346 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}119\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d x])^3}49\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-$$

$$\left(22\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(26\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Cos}[c+d x]}\left(-\frac{2\,(60 A-20 B+59 A\,\text{Cos}[c]-29 B\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{5 d}-\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(59 A\,\text{Sin}\left[\frac{d x}{2}\right]-29 B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(16 A\,\text{Sin}\left[\frac{d x}{2}\right]-11 B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{15 d}-$$

$$\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{16\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}[d\,x]}{3\,d}+$$

$$\left.\frac{16\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\left(A\,\mathrm{Sin}[c]-9\,A\,\mathrm{Sin}[d\,x]+3\,B\,\mathrm{Sin}[d\,x]\right)}{3\,d}-\frac{4\,(16\,A-11\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 166: Result unnecessarily involves imaginary or complex numbers.**

$$\int \mathrm{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]\right)\,dx$$

Optimal (type 3, 221 leaves, 6 steps):

$$\frac{5\,\sqrt{a}\,(8\,A+7\,B)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{5\,a\,(8\,A+7\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{64\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{5\,a\,(8\,A+7\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{96\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,(8\,A+7\,B)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,B\,\mathrm{Cos}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 330 leaves):

$$\frac{1}{768\,d}$$

$$\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(\left(15\,i\,(8\,A+7\,B)\,e^{\frac{i\,d\,x}{2}}\,\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\,\right]-\mathrm{Log}\left[\right.\right.\right.\right.$$

$$\left.\left.2\,\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)\right]\right)$$

$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right)\Big/\left(\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)+$$

$$\left.4\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(152\,A+133\,B+2\,(40\,A+53\,B)\,\mathrm{Cos}[c+d\,x]+4\,(8\,A+7\,B)\,\mathrm{Cos}[2\,(c+d\,x)]+12\,B\,\mathrm{Cos}[3\,(c+d\,x)]\right)\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 167: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]\right)\,dx$$

Optimal (type 3, 176 leaves, 5 steps):

$$\frac{\sqrt{a}\,(6\,A+5\,B)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a\,(6\,A+5\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a\,(6\,A+5\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,B\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 620 leaves):

$$\frac{1}{48\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\left(-3\,i\,(6\,A+5\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$

$$3\,i\,(6\,A+5\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$

$$18\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$

$$15\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$

$$24\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$28\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+12\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$\left.6\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

- **Problem 168: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 3, 131 leaves, 4 steps):

$$\frac{\sqrt{a}\,(4\,A+3\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a\,(4\,A+3\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,B\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 536 leaves):

$$\frac{1}{8\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-i\,(4\,A+3\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$i\,(4\,A+3\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$4\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$3\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$8\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$\left.4\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)$$

- **Problem 169: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 78 leaves, 3 steps):

$$\frac{\sqrt{a}\,(2\,A+B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{a\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 447 leaves):

$$\frac{1}{2\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-i\,(2\,A+B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$i\,(2\,A+B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$2\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.2\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 170: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{a + a \cos[c + d x]}\ (A + B \cos[c + d x])}{\cos[c + d x]^{3/2}}\, dx$$

Optimal (type 3, 76 leaves, 3 steps):

$$\frac{2 \sqrt{a}\ B \operatorname{ArcSin}\left[\frac{\sqrt{a}\ \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right]}{d} + \frac{2 a A \sin[c + d x]}{d \sqrt{\cos[c + d x]}\ \sqrt{a + a \cos[c + d x]}}$$

Result (type 3, 294 leaves):

$$\frac{1}{\sqrt{2}\ d \sqrt{\cos[c + d x]}\ \sqrt{\cos[c + d x]\ (\cos[d x] + i \sin[d x])}} \sqrt{a\ (1 + \cos[c + d x])}\ \sec\left[\frac{1}{2}\ (c + d x)\right]$$
$$\left(\cos\left[\frac{d x}{2}\right] + i \sin\left[\frac{d x}{2}\right]\right) \left(i B \operatorname{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right] + i \sin\left[\frac{c}{2}\right]\right) \sqrt{\left(1 + e^{2 i d x}\right) \cos[c] + i \left(-1 + e^{2 i d x}\right) \sin[c]}\ \right] \cos[c + d x] -\right.$$
$$i B \cos[c + d x] \operatorname{Log}\left[2 \left(e^{i d x} \cos\left[\frac{c}{2}\right] + i e^{i d x} \sin\left[\frac{c}{2}\right] + \sqrt{\left(1 + e^{2 i d x}\right) \cos[c] + i \left(-1 + e^{2 i d x}\right) \sin[c]}\right)\right] +$$
$$\left. 2 \sqrt{2}\ A \left(\cos\left[\frac{d x}{2}\right] - i \sin\left[\frac{d x}{2}\right]\right) \sqrt{\cos[c + d x]\ (\cos[d x] + i \sin[d x])}\ \sin\left[\frac{1}{2}\ (c + d x)\right]\right)$$

## Problem 174: Result unnecessarily involves imaginary or complex numbers.

$$\int \cos[c + d x]^{3/2}\ (a + a \cos[c + d x])^{3/2}\ (A + B \cos[c + d x])\, dx$$

Optimal (type 3, 227 leaves, 6 steps):

$$\frac{a^{3/2}\ (88 A + 75 B) \operatorname{ArcSin}\left[\frac{\sqrt{a}\ \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right]}{64 d} + \frac{a^2\ (88 A + 75 B) \sqrt{\cos[c + d x]}\ \sin[c + d x]}{64 d \sqrt{a + a \cos[c + d x]}} +$$
$$\frac{a^2\ (88 A + 75 B) \cos[c + d x]^{3/2} \sin[c + d x]}{96 d \sqrt{a + a \cos[c + d x]}} + \frac{a^2\ (8 A + 9 B) \cos[c + d x]^{5/2} \sin[c + d x]}{24 d \sqrt{a + a \cos[c + d x]}} + \frac{a B \cos[c + d x]^{5/2} \sqrt{a + a \cos[c + d x]}\ \sin[c + d x]}{4 d}$$

Result (type 3, 356 leaves):

$$-\frac{1}{768\,d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}}$$
$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\left(-3\,i\,(88\,A+75\,B)\,e^{\frac{i\,d\,x}{2}}\,\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\mathrm{Log}\left[2\,\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\,-4\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,(296\,A+285\,B+2\,(88\,A+93\,B)\,\mathrm{Cos}[c+d\,x]+$$
$$\left.4\,(8\,A+15\,B)\,\mathrm{Cos}[2\,(c+d\,x)]+12\,B\,\mathrm{Cos}[3\,(c+d\,x)])\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 175: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\,\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,dx$$

Optimal (type 3, 180 leaves, 5 steps) :

$$\frac{a^{3/2}\,(14\,A+11\,B)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a^2\,(14\,A+11\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a^2\,(6\,A+7\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,B\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 621 leaves) :

$$\frac{1}{48\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-3\,i\,(14\,A+11\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,(14\,A+11\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$42\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$33\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$72\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$52\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+12\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$
$$\left.18\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

- **Problem 176: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 133 leaves, 4 steps):

$$\frac{a^{3/2}\,(12\,A+7\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a^2\,(4\,A+5\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 3, 537 leaves):

$$\frac{1}{8\,d\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}}\,a\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]$$

$$\Bigg(-i\,(12\,A+7\,B)\,\mathrm{Cos}\Big[\frac{d\,x}{2}\Big]\,\mathrm{Log}\Big[2\left(e^{i\,d\,x}\,\mathrm{Cos}\Big[\frac{c}{2}\Big]+i\,e^{i\,d\,x}\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\Big]+$$

$$i\,(12\,A+7\,B)\,\mathrm{ArcTanh}\Big[\left(\mathrm{Cos}\Big[\frac{c}{2}\Big]+i\,\mathrm{Sin}\Big[\frac{c}{2}\Big]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\Big]\left(\mathrm{Cos}\Big[\frac{d\,x}{2}\Big]+i\,\mathrm{Sin}\Big[\frac{d\,x}{2}\Big]\right)+$$

$$12\,A\,\mathrm{Log}\Big[2\left(e^{i\,d\,x}\,\mathrm{Cos}\Big[\frac{c}{2}\Big]+i\,e^{i\,d\,x}\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\Big]\,\mathrm{Sin}\Big[\frac{d\,x}{2}\Big]+$$

$$7\,B\,\mathrm{Log}\Big[2\left(e^{i\,d\,x}\,\mathrm{Cos}\Big[\frac{c}{2}\Big]+i\,e^{i\,d\,x}\,\mathrm{Sin}\Big[\frac{c}{2}\Big]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\Big]\,\mathrm{Sin}\Big[\frac{d\,x}{2}\Big]+$$

$$8\sqrt{2}\,A\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$12\sqrt{2}\,B\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]+2\sqrt{2}\,B\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\Big[\frac{3}{2}\,(c+d\,x)\Big]\Bigg)$$

- **Problem 177: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 126 leaves, 4 steps):

$$\frac{a^{3/2}\,(2\,A+3\,B)\,\mathrm{ArcSin}\Big[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\Big]}{d}-\frac{a^2\,(2\,A-B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,a\,A\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\sqrt{\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 869 leaves):

$$\frac{1}{4}\,(2\,A+3\,B)\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{3}$$

$$\Bigg(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\,\Bigg(-\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)-$$

$$\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\Bigg)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\,\Bigg(-\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)+$$

$$\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\Bigg)\Bigg)+$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{3}\,\left(\frac{B\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]}{2\,d}+\frac{B\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+\right.$$

$$\left.\frac{A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d}\right)$$

- **Problem 178: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 125 leaves, 4 steps):

$$\frac{2\,a^{3/2}\,B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^{2}\,(4\,A+3\,B)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,a\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 3, 702 leaves):

$$\frac{1}{12\sqrt{2}\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\sqrt{\mathrm{Cos}[c+d\,x]}\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}$$
$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\left(\frac{3}{2}\,i\,B\,e^{-\frac{3}{2}i\,d\,x}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\right.$$
$$\mathrm{Cos}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)^2-\frac{3}{2}\,i\,B\,e^{-\frac{3}{2}i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]^2$$
$$\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)^2+\frac{3}{2}\,i\,B$$
$$e^{-\frac{3}{2}i\,d\,x}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\mathrm{Sin}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)^2-$$
$$\frac{3}{2}\,i\,B\,e^{-\frac{3}{2}i\,d\,x}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{c}{2}\right]^2$$
$$\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)^2+4\,A\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+$$
$$20\,A\,\mathrm{Cos}[c+d\,x]\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+$$
$$\left.12\,B\,\mathrm{Cos}[c+d\,x]\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 182: Result unnecessarily involves imaginary or complex numbers.**

$$\int \mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,dx$$

Optimal (type 3, 274 leaves, 7 steps) :

$$\frac{a^{5/2}\,(326\,A+283\,B)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{128\,d}+\frac{a^3\,(326\,A+283\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{128\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a^3\,(326\,A+283\,B)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{192\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^3\,(170\,A+157\,B)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{240\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a^2\,(10\,A+13\,B)\,\mathrm{Cos}[c+d\,x]^{5/2}\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{40\,d}+\frac{a\,B\,\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}$$

Result (type 3, 377 leaves) :

$$-\frac{1}{15360\, d \sqrt{2\left(1+e^{2 i d x}\right) \text{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}} (a\, (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{1}{2} (c+d x)\right]^5$$
$$\left(-15 i\, (326 A+283 B)\, e^{\frac{i d x}{2}} \left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}-4 \sqrt{\text{Cos}[c+d x]}$$
$$(5810 A+5521 B+(3620 A+3874 B) \text{Cos}[c+d x]+4\, (230 A+331 B) \text{Cos}[2 (c+d x)]+120 A \text{Cos}[3 (c+d x)]+$$
$$\left.\left.348 B \text{Cos}[3 (c+d x)]+48 B \text{Cos}[4 (c+d x)]) \sqrt{\text{Cos}[c+d x] (\text{Cos}[d x]+i \text{Sin}[d x])}\, \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)$$

## Problem 183: Result unnecessarily involves imaginary or complex numbers.

$$\int \sqrt{\text{Cos}[c+d x]}\, (a+a \text{Cos}[c+d x])^{5/2} (A+B \text{Cos}[c+d x])\, dx$$

Optimal (type 3, 227 leaves, 6 steps):

$$\frac{a^{5/2} (200 A+163 B) \text{ArcSin}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{64 d}+\frac{a^3 (200 A+163 B) \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{64 d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{a^3 (104 A+95 B) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{96 d \sqrt{a+a \text{Cos}[c+d x]}}+$$
$$\frac{a^2 (8 A+11 B) \text{Cos}[c+d x]^{3/2} \sqrt{a+a \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{24 d}+\frac{a B \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{4 d}$$

Result (type 3, 355 leaves):

$$-\frac{1}{1536\, d \sqrt{2\left(1+e^{2 i d x}\right) \text{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}} (a\, (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{1}{2} (c+d x)\right]^5$$
$$\left(-3 i\, (200 A+163 B)\, e^{\frac{i d x}{2}} \left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}-4 \sqrt{\text{Cos}[c+d x]}\, (632 A+581 B+(272 A+362 B) \text{Cos}[c+d x]+$$
$$\left.\left.4\, (8 A+23 B) \text{Cos}[2 (c+d x)]+12 B \text{Cos}[3 (c+d x)]) \sqrt{\text{Cos}[c+d x] (\text{Cos}[d x]+i \text{Sin}[d x])}\, \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)$$

## Problem 184: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{(a+a \text{Cos}[c+d x])^{5/2} (A+B \text{Cos}[c+d x])}{\sqrt{\text{Cos}[c+d x]}}\, dx$$

Optimal (type 3, 180 leaves, 5 steps):

$$\frac{a^{5/2}\,(38\,A+25\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a^3\,(54\,A+49\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a^2\,(2\,A+3\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}+\frac{a\,B\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 623 leaves):

$$\frac{1}{48\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,a^2\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\left(-3\,i\,(38\,A+25\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$

$$3\,i\,(38\,A+25\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$

$$114\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$

$$75\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$

$$120\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$124\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+12\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$\left.30\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

- **Problem 185: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 178 leaves, 5 steps):

$$\frac{a^{5/2}\,(20\,A+19\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{a^3\,(4\,A-9\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$

$$\frac{a^2\,(4\,A-B)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 926 leaves):

$$\frac{1}{32}(20A+19B)(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5$$
$$\left(\frac{1}{2}\,i\,\mathrm{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\,\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right)+$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\mathrm{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\mathrm{Sin}[c]}\right)\right)\right)+$$
$$\sqrt{\mathrm{Cos}[c+dx]}\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\left(\frac{(2A+5B)\,\mathrm{Cos}\left[\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{8d}+\frac{B\,\mathrm{Cos}\left[\frac{3dx}{2}\right]\mathrm{Sin}\left[\frac{3c}{2}\right]}{16d}+\right.$$
$$\frac{(2A+5B)\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{8d}+$$
$$\left.\frac{B\,\mathrm{Cos}\left[\frac{3c}{2}\right]\mathrm{Sin}\left[\frac{3dx}{2}\right]}{16d}+\frac{A\,\mathrm{Sec}[c+dx]\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]}{2d}\right)$$

- **Problem 186: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+dx])^{5/2}\,(A+B\,\mathrm{Cos}[c+dx])}{\mathrm{Cos}[c+dx]^{5/2}}\,dx$$

Optimal (type 3, 173 leaves, 5 steps):

$$\frac{a^{5/2}\,(2A+5B)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{d}-\frac{a^3\,(14A+3B)\,\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{3d\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+$$
$$\frac{2a^2\,(2A+B)\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{d\,\sqrt{\mathrm{Cos}[c+dx]}}+\frac{2aA\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}\,\mathrm{Sin}[c+dx]}{3d\,\mathrm{Cos}[c+dx]^{3/2}}$$

Result (type 3, 920 leaves):

$$\frac{1}{8}(2A+5B)\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5$$

$$\left(\frac{1}{2}\,\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)-$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)+$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(\frac{B\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{4\,d}+\frac{B\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+\right.$$

$$\frac{A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{6\,d}+$$

$$\left.\frac{\mathrm{Sec}[c+d\,x]\left(8\,A\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+3\,B\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}{6\,d}\right)$$

- **Problem 187: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 3, 172 leaves, 5 steps):

$$\frac{2\,a^{5/2}\,B\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^3\,(32\,A+35\,B)\,\mathrm{Sin}[c+d\,x]}{15\,d\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^2\,(8\,A+5\,B)\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}$$

Result (type 3, 800 leaves):

$$\frac{1}{120\sqrt{2}\,d\,\text{Cos}[c+d\,x]^{5/2}\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^{5}$$

$$\left(\frac{15}{4}\,B\,e^{-\frac{5}{2}\,i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]^{2}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\right.$$

$$\left(i\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)^{3}+\frac{15}{4}\,B\,e^{-\frac{5}{2}\,i\,d\,x}\,\text{Log}\Big[$$

$$2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\Big]\,\text{Sin}\left[\frac{c}{2}\right]^{2}\left(i\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)^{3}+$$

$$\frac{15}{4}\,i\,B\,e^{-\frac{5}{2}\,i\,d\,x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\text{Cos}\left[\frac{c}{2}\right]^{2}$$

$$\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)^{3}+\frac{15}{4}\,i\,B\,e^{-\frac{5}{2}\,i\,d\,x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]$$

$$\text{Sin}\left[\frac{c}{2}\right]^{2}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)^{3}+12\,A\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$56\,A\,\text{Cos}[c+d\,x]\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$20\,B\,\text{Cos}[c+d\,x]\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$172\sqrt{2}\,A\,\text{Cos}[c+d\,x]^{2}\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$\left.160\sqrt{2}\,B\,\text{Cos}[c+d\,x]^{2}\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 191: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 190 leaves, 7 steps):

$$-\frac{(4\,A-7\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+$$

$$\frac{(4\,A-B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{B\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 348 leaves):

$$\frac{1}{8\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(1\Big/\left(d\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(-4\,A\,d\,x+7\,B\,d\,x+i\,(4\,A-7\,B)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-8\,i\,\sqrt{2}\,(A-B)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-4\,i\,A\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+7\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+8\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\sqrt{\text{Cos}[c+d\,x]}\,(4\,A-B+2\,B\,\text{Cos}[c+d\,x])\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{d}\right)$$

- **Problem 192: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 141 leaves, 6 steps):

$$\frac{(2\,A-B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{B\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 333 leaves):

$$\frac{1}{2\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(1\Big/\left(d\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(2\,A\,d\,x-B\,d\,x-i\,(2\,A-B)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+2\,i\,\sqrt{2}\,(A-B)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+2\,i\,A\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+2\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,B\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{d}\right)$$

- **Problem 193: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 100 leaves, 5 steps):

$$\frac{2\,B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}$$

Result (type 3, 255 leaves):

$$\left(\left(1+e^{i(c+dx)}\right)\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\right.$$
$$\left(B\,d\,x - i\,B\,\text{ArcSinh}\left[e^{i(c+dx)}\right] - i\sqrt{2}\,(A-B)\,\text{Log}\left[1+e^{i(c+dx)}\right] + i\,B\,\text{Log}\left[1+\sqrt{1+e^{2i(c+dx)}}\right] + i\sqrt{2}\,A\,\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right] -\right.$$
$$\left.\left.i\sqrt{2}\,B\,\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/\left(\sqrt{2}\,d\sqrt{1+e^{2i(c+dx)}}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 194: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 99 leaves, 4 steps):

$$-\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 177 leaves):

$$\frac{1}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}$$
$$2\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(1\Big/\left(\sqrt{1+e^{2i(c+dx)}}\right)i\,(A-B)\,e^{\frac{1}{2}i(c+dx)}\sqrt{e^{-i(c+dx)}\left(1+e^{2i(c+dx)}\right)}\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)+\right.$$
$$\left.\frac{2\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 195: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{5/2}\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 142 leaves, 5 steps):

$$\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-3\,B)\,\text{Sin}[c+d\,x]}{3\,d\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 206 leaves):

$$\frac{1}{3\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}2\,\text{Cos}\Big[\frac{1}{2}\,(c+d\,x)\Big]\left(-1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)3\,i\,(A-B)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\Big[1+e^{i\,(c+d\,x)}\Big]-\text{Log}\Big[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\Big]\right)+\frac{2\,A\,\text{Sin}\big[\frac{1}{2}\,(c+d\,x)\big]}{\text{Cos}[c+d\,x]^{3/2}}-\frac{2\,(A-3\,B)\,\text{Sin}\big[\frac{1}{2}\,(c+d\,x)\big]}{\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 196: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 187 leaves, 6 steps):

$$-\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\Big[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\Big]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-5\,B)\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,(13\,A-5\,B)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 235 leaves):

$$\left(2\,\text{Cos}\Big[\frac{1}{2}\,(c+d\,x)\Big]\left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)15\,i\,(A-B)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\Big[1+e^{i\,(c+d\,x)}\Big]-\text{Log}\Big[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\Big]\right)+\frac{6\,A\,\text{Sin}\big[\frac{1}{2}\,(c+d\,x)\big]}{\text{Cos}[c+d\,x]^{5/2}}-\frac{2\,(A-5\,B)\,\text{Sin}\big[\frac{1}{2}\,(c+d\,x)\big]}{\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,(13\,A-5\,B)\,\text{Sin}\big[\frac{1}{2}\,(c+d\,x)\big]}{\sqrt{\text{Cos}[c+d\,x]}}\right)\right)\Big/\left(15\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 197: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 197 leaves, 7 steps):

$$\frac{(2A-3B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{3/2}\,d}-\frac{(5A-9B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\sqrt{2}\,a^{3/2}\,d}+\frac{(A-B)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}-\frac{(A-3B)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 362 leaves):

$$\frac{1}{2\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^3\left(1\Big/\left(d\sqrt{1+e^{2 i (c+d x)}}\right)\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\right.$$
$$\left(4 A d x-6 B d x-2 i (2A-3B)\,\text{ArcSinh}\left[e^{i (c+d x)}\right]+i\sqrt{2}\,(5A-9B)\,\text{Log}\left[1+e^{i (c+d x)}\right]+4 i A\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-\right.$$
$$\left.6 i B\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-5 i\sqrt{2}\,A\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]+9 i\sqrt{2}\,B\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)+$$
$$\left.\frac{2\sqrt{\text{Cos}[c+d x]}\,(-A+3B+2B\,\text{Cos}[c+d x])\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]}{d}\right)$$

- **Problem 198: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d x]}\,(A+B\,\text{Cos}[c+d x])}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 145 leaves, 6 steps):

$$\frac{2B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{3/2}\,d}+\frac{(A-5B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\sqrt{2}\,a^{3/2}\,d}+\frac{(A-B)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 313 leaves):

$$\frac{1}{2\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d x)\right]^3$$
$$\left(1\Big/\left(d\sqrt{1+e^{2 i (c+d x)}}\right)\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\left(4 B d x-4 i B\,\text{ArcSinh}\left[e^{i (c+d x)}\right]-i\sqrt{2}\,(A-5B)\,\text{Log}\left[1+e^{i (c+d x)}\right]+\right.\right.$$
$$\left.4 i B\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+i\sqrt{2}\,A\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]-5 i\sqrt{2}\,B\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\right)+$$
$$\left.\frac{2\,(A-B)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]}{d}\right)$$

## Problem 199: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 107 leaves, 4 steps):

$$\frac{(3\,A+B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 195 leaves):

$$\frac{1}{(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}}\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,(3\,A+B)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$
$$\left.\frac{(A-B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d}\right)$$

## Problem 200: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 156 leaves, 5 steps):

$$-\frac{(7\,A-3\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{(5\,A-B)\,\mathrm{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 209 leaves):

$$\frac{1}{(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}}\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,(7\,A-3\,B)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$\left.\frac{(4\,A+(5\,A-B)\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right)$$

## Problem 201: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 203 leaves, 6 steps) :

$$\frac{(11 A-7 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}-\frac{(A-B) \operatorname{Sin}[c+d x]}{2 d \operatorname{Cos}[c+d x]^{3/2} (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(7 A-3 B) \operatorname{Sin}[c+d x]}{6 a d \operatorname{Cos}[c+d x]^{3/2} \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(19 A-15 B) \operatorname{Sin}[c+d x]}{6 a d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 230 leaves) :

$$\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{3/2}} \operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \left(-1 \Big/ \left(d \sqrt{1+e^{2 i (c+d x)}}\right) i (11 A-7 B) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)-\frac{(11 A-15 B+24 (A-B) \operatorname{Cos}[c+d x]+(19 A-15 B) \operatorname{Cos}[2 (c+d x)]) \operatorname{Sec}\left[\frac{1}{2} (c+d x)\right] \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]}{6 d \operatorname{Cos}[c+d x]^{3/2}}\right)$$

- **Problem 202: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\operatorname{Cos}[c+d x]^{5/2} (A+B \operatorname{Cos}[c+d x])}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 246 leaves, 8 steps) :

$$\frac{(2 A-5 B) \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{a^{5/2} d}-\frac{(43 A-115 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}+\frac{(A-B) \operatorname{Cos}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}+\frac{(7 A-15 B) \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}-\frac{(11 A-35 B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 376 leaves) :

$$\frac{1}{8 d (a (1+\text{Cos}[c+d x]))^{5/2}} \text{Cos}\left[\frac{1}{2} (c+d x)\right]^5 \left(\frac{1}{\sqrt{1+e^{2 i (c+d x)}}} \sqrt{2} e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(32 A d x-80 B d x-16 i (2 A-5 B) \text{ArcSinh}\left[e^{i (c+d x)}\right]+ i \sqrt{2} (43 A-115 B) \text{Log}\left[1+e^{i (c+d x)}\right]+32 i A \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-80 i B \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]- 43 i \sqrt{2} A \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]+115 i \sqrt{2} B \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+ \sqrt{\text{Cos}[c+d x]} (-11 A+43 B+(-15 A+55 B) \text{Cos}[c+d x]+8 B \text{Cos}[2 (c+d x)]) \text{Sec}\left[\frac{1}{2} (c+d x)\right]^3 \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right)$$

## Problem 203: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d x]^{3/2} (A+B \text{Cos}[c+d x])}{(a+a \text{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 194 leaves, 7 steps):

$$\frac{2 B \text{ArcSin}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{a^{5/2} d}+\frac{(3 A-43 B) \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}+ \frac{(A-B) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{4 d (a+a \text{Cos}[c+d x])^{5/2}}+\frac{(3 A-11 B) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{16 a d (a+a \text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 329 leaves):

$$\frac{1}{8 d (a (1+\text{Cos}[c+d x]))^{5/2}} \text{Cos}\left[\frac{1}{2} (c+d x)\right]^5 \left(\frac{1}{\sqrt{1+e^{2 i (c+d x)}}} \sqrt{2} e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(32 B d x-32 i B \text{ArcSinh}\left[e^{i (c+d x)}\right]- i \sqrt{2} (3 A-43 B) \text{Log}\left[1+e^{i (c+d x)}\right]+ 32 i B \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+3 i \sqrt{2} A \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]-43 i \sqrt{2} B \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+ \sqrt{\text{Cos}[c+d x]} (3 A-11 B+(7 A-15 B) \text{Cos}[c+d x]) \text{Sec}\left[\frac{1}{2} (c+d x)\right]^3 \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right)$$

## Problem 204: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\sqrt{\text{Cos}[c+d x]} (A+B \text{Cos}[c+d x])}{(a+a \text{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 154 leaves, 5 steps):

$$\frac{(5 A+3 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2} d}+\frac{(A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}+\frac{(A+7 B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 215 leaves):

$$\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^5 \left(-1\Big/\left(\sqrt{1+e^{2 i (c+d x)}}\right) i (5 A+3 B) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)} \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+\frac{1}{2} \sqrt{\operatorname{Cos}[c+d x]} (5 A+3 B+(A+7 B) \operatorname{Cos}[c+d x]) \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(4 d (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)$$

## Problem 205: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B \operatorname{Cos}[c+d x]}{\sqrt{\operatorname{Cos}[c+d x]} (a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 156 leaves, 5 steps):

$$\frac{(19 A+5 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2} d}-\frac{(A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(9 A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 217 leaves):

$$\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^5 \left(-1\Big/\left(\sqrt{1+e^{2 i (c+d x)}}\right) i (19 A+5 B) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)} \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)-\frac{1}{2} \sqrt{\operatorname{Cos}[c+d x]} (13 A-5 B+(9 A-B) \operatorname{Cos}[c+d x]) \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(4 d (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)$$

## Problem 206: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B \operatorname{Cos}[c+d x]}{\operatorname{Cos}[c+d x]^{3/2} (a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 203 leaves, 6 steps):

$$-\frac{(75 A-19 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2}\, a^{5/2} d}-\frac{(A-B) \operatorname{Sin}[c+d x]}{4 d \sqrt{\operatorname{Cos}[c+d x]} (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(13 A-5 B) \operatorname{Sin}[c+d x]}{16 a d \sqrt{\operatorname{Cos}[c+d x]} (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(49 A-9 B) \operatorname{Sin}[c+d x]}{16 a^2 d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 234 leaves) :

$$\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5 \left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right) i\,(75\,A-19\,B)\,e^{\frac{1}{2}i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+1\Big/\left(4\sqrt{\text{Cos}[c+d\,x]}\right)(113\,A-9\,B+2\,(85\,A-13\,B)\,\text{Cos}[c+d\,x]+(49\,A-9\,B)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)$$

- **Problem 207: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 250 leaves, 7 steps) :

$$\frac{(163\,A-75\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\sqrt{2}\,a^{5/2}\,d}-\frac{(A-B)\,\text{Sin}[c+d\,x]}{4\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(17\,A-9\,B)\,\text{Sin}[c+d\,x]}{16\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(95\,A-39\,B)\,\text{Sin}[c+d\,x]}{48\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(299\,A-147\,B)\,\text{Sin}[c+d\,x]}{48\,a^2\,d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 256 leaves) :

$$-\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5 \left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)3\,i\,(163\,A-75\,B)\,e^{\frac{1}{2}i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+1\Big/\left(8\,\text{Cos}[c+d\,x]^{3/2}\right)(878\,A-510\,B+(1537\,A-825\,B)\,\text{Cos}[c+d\,x]+2\,(503\,A-255\,B)\,\text{Cos}[2\,(c+d\,x)]+299\,A\,\text{Cos}[3\,(c+d\,x)]-147\,B\,\text{Cos}[3\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(12\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)$$

- **Problem 208: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d\,x]^{7/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 293 leaves, 9 steps) :

$$\frac{(2A-7B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{7/2}\,d}-\frac{(177A-637B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{64\sqrt{2}\,a^{7/2}\,d}+\frac{(A-B)\,\text{Cos}[c+d x]^{7/2}\,\text{Sin}[c+d x]}{6d\,(a+a\,\text{Cos}[c+d x])^{7/2}}+$$

$$\frac{(3A-7B)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}}+\frac{(79A-259B)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}-\frac{7\,(7A-27B)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{64\,a^3\,d\,\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 639 leaves):

$$\frac{1}{8\sqrt{2}\,d\sqrt{1+e^{2 i (c+d x)}}\,(a\,(1+\text{Cos}[c+d x]))^{7/2}}$$

$$e^{\frac{1}{2} i (c+d x)}\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7\Big(128 A d x-448 B d x-64 i\,(2A-7B)\,\text{ArcSinh}\left[e^{i (c+d x)}\right]+$$

$$i\sqrt{2}\,(177A-637B)\,\text{Log}\left[1+e^{i (c+d x)}\right]+128\,i\,A\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-448\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-$$

$$177\,i\sqrt{2}\,A\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]+637\,i\sqrt{2}\,B\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\sqrt{1+e^{2 i (c+d x)}}\right]\Big)+\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{7/2}}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7\sqrt{\text{Cos}[c+d x]}\left(\frac{16 B\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}+\frac{16 B\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(11 A\,\text{Sin}\left[\frac{d x}{2}\right]-15 B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{4d}+\right.$$

$$\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\left(-A\,\text{Sin}\left[\frac{d x}{2}\right]+B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{3d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\left(-247 A\,\text{Sin}\left[\frac{d x}{2}\right]+523 B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{24d}-$$

$$\left.\frac{(247A-523B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24d}+\frac{(11A-15B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{4d}-\frac{(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3d}\right)$$

## Problem 209: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cos}[c+d x]^{5/2}\,(A+B\,\text{Cos}[c+d x])}{(a+a\,\text{Cos}[c+d x])^{7/2}}\,dx$$

Optimal (type 3, 241 leaves, 8 steps):

$$\frac{2B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{7/2}\,d}+\frac{(5A-177B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{64\sqrt{2}\,a^{7/2}\,d}+$$

$$\frac{(A-B)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{6d\,(a+a\,\text{Cos}[c+d x])^{7/2}}+\frac{(5A-17B)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{48\,a\,d\,(a+a\,\text{Cos}[c+d x])^{5/2}}+\frac{(5A-49B)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{64\,a^2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 350 leaves):

$$\frac{1}{48\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^7$$
$$\left(\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}3\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(128\,B\,d\,x-128\,i\,B\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(5\,A-177\,B)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$
$$\left.128\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+5\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-177\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$
$$\left.\frac{1}{4}\,\sqrt{\text{Cos}[c+d\,x]}\,(97\,A-541\,B+4\,(25\,A-181\,B)\,\text{Cos}[c+d\,x]+(67\,A-247\,B)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 210: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 201 leaves, 6 steps) :

$$\frac{(7\,A+5\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}+\frac{(A-B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}+$$
$$\frac{(A-13\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}+\frac{(17\,A+67\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 234 leaves) :

$$\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^7\right.$$
$$\left(-1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)3\,i\,(7\,A+5\,B)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$\frac{1}{8}\,\sqrt{\text{Cos}[c+d\,x]}\,(59\,A+97\,B+20\,(7\,A+5\,B)\,\text{Cos}[c+d\,x]+(17\,A+67\,B)\,\text{Cos}[2\,(c+d\,x)])$$
$$\left.\left.\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(24\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}\right)$$

- **Problem 211: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])}{(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 201 leaves, 6 steps) :

$$\frac{(13 A+7 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{64 \sqrt{2} a^{7/2} d}+\frac{(A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{6 d (a+a \operatorname{Cos}[c+d x])^{7/2}}+$$
$$\frac{(A+3 B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(5 A-17 B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{192 a^2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 232 leaves) :

$$\left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^7\right.$$
$$\left(-1 \Big/ \left(\sqrt{1+e^{2 i (c+d x)}}\right) 3 i (13 A+7 B) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+\right.$$
$$\frac{1}{8} \sqrt{\operatorname{Cos}[c+d x]} (73 A+59 B+4 (A+35 B) \operatorname{Cos}[c+d x]+(-5 A+17 B) \operatorname{Cos}[2 (c+d x)])$$
$$\left.\left.\operatorname{Sec}\left[\frac{1}{2} (c+d x)\right]^5 \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]\right)\right) \Big/ \left(24 d (a (1+\operatorname{Cos}[c+d x]))^{7/2}\right)$$

## Problem 212: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B \operatorname{Cos}[c+d x]}{\sqrt{\operatorname{Cos}[c+d x]} (a+a \operatorname{Cos}[c+d x])^{7/2}} \, dx$$

Optimal (type 3, 203 leaves, 6 steps) :

$$\frac{(63 A+13 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{64 \sqrt{2} a^{7/2} d}-\frac{(A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{6 d (a+a \operatorname{Cos}[c+d x])^{7/2}}-$$
$$\frac{(5 A-B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(103 A+5 B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{192 a^2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 233 leaves) :

$$-\left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^7\right.$$
$$\left(1 \Big/ \left(\sqrt{1+e^{2 i (c+d x)}}\right) 3 i (63 A+13 B) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+\right.$$
$$\frac{1}{8} \sqrt{\operatorname{Cos}[c+d x]} (493 A-73 B+(532 A-4 B) \operatorname{Cos}[c+d x]+(103 A+5 B) \operatorname{Cos}[2 (c+d x)])$$
$$\left.\left.\operatorname{Sec}\left[\frac{1}{2} (c+d x)\right]^5 \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]\right)\right) \Big/ \left(24 d (a (1+\operatorname{Cos}[c+d x]))^{7/2}\right)$$

## Problem 213: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 250 leaves, 7 steps):

$$-\frac{3\,(121\,A-21\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{6\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}}-$$
$$\frac{(19\,A-7\,B)\,\mathrm{Sin}[c+d\,x]}{48\,a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}-\frac{(199\,A-43\,B)\,\mathrm{Sin}[c+d\,x]}{192\,a^2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{(691\,A-103\,B)\,\mathrm{Sin}[c+d\,x]}{192\,a^3\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 257 leaves):

$$\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^7\right.$$
$$\left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)9\,i\,(121\,A-21\,B)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$1\Big/\left(16\,\sqrt{\mathrm{Cos}[c+d\,x]}\right)(5284\,A-532\,B+9\,(941\,A-121\,B)\,\mathrm{Cos}[c+d\,x]+4\,(937\,A-133\,B)\,\mathrm{Cos}[2\,(c+d\,x)]+$$
$$\left.\left.691\,A\,\mathrm{Cos}[3\,(c+d\,x)]-103\,B\,\mathrm{Cos}[3\,(c+d\,x)])\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(24\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{7/2}\right)$$

## Problem 214: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 297 leaves, 8 steps):

$$\frac{(1015\,A-363\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{6\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}}-\frac{(23\,A-11\,B)\,\mathrm{Sin}[c+d\,x]}{48\,a\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}-$$
$$\frac{(109\,A-41\,B)\,\mathrm{Sin}[c+d\,x]}{64\,a^2\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{(579\,A-199\,B)\,\mathrm{Sin}[c+d\,x]}{192\,a^3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}-\frac{(1887\,A-691\,B)\,\mathrm{Sin}[c+d\,x]}{192\,a^3\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 524 leaves):

$$-\left(i\,(1015\,A-363\,B)\,e^{\frac{1}{2}i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$

$$\left(8\,d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{7/2}\right)+\frac{1}{\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{7/2}}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(-A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(-13\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+9\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{4\,d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\left(-607\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+307\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{24\,d}+$$

$$\frac{32\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}-\frac{32\,\mathrm{Sec}[c+d\,x]\,\left(10\,A\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-3\,B\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}{3\,d}-$$

$$\left.\frac{(607\,A-307\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Tan}\left[\frac{c}{2}\right]}{24\,d}-\frac{(13\,A-9\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Tan}\left[\frac{c}{2}\right]}{4\,d}-\frac{(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 218: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 35 leaves, 4 steps) :

$$(A\,b+a\,B)\,x+\frac{a\,A\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}+\frac{b\,B\,\mathrm{Sin}[c+d\,x]}{d}$$

Result (type 3, 104 leaves) :

$$A\,b\,x+a\,B\,x-\frac{a\,A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{b\,B\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{d}+\frac{b\,B\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}$$

- **Problem 219: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 35 leaves, 4 steps) :

$$b\,B\,x+\frac{(A\,b+a\,B)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{d}+\frac{a\,A\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 159 leaves) :

$$b\,B\,x-\frac{A\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}-\frac{a\,B\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+$$

$$\frac{A\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,B\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,A\,\mathrm{Tan}[c+d\,x]}{d}$$

## Problem 220: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 61 leaves, 6 steps):

$$\frac{(a\,A+2\,b\,B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{(A\,b+a\,B)\,\text{Tan}[c+d\,x]}{d}+\frac{a\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 164 leaves):

$$\frac{1}{4\,d}\left(-2\,(a\,A+2\,b\,B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$2\,a\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+4\,b\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$\left.\frac{a\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{a\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+4\,(A\,b+a\,B)\,\text{Tan}[c+d\,x]\right)$$

## Problem 222: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 114 leaves, 7 steps):

$$\frac{(3\,a\,A+4\,b\,B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{8\,d}+\frac{(A\,b+a\,B)\,\text{Tan}[c+d\,x]}{d}+$$
$$\frac{(3\,a\,A+4\,b\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{8\,d}+\frac{a\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}+\frac{(A\,b+a\,B)\,\text{Tan}[c+d\,x]^3}{3\,d}$$

Result (type 3, 403 leaves):

$$-\frac{3\,a\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}-\frac{b\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\frac{3\,a\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{b\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\frac{a\,A}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{3\,a\,A}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{b\,B}{4\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{a\,A}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}-\frac{3\,a\,A}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-$$
$$\frac{b\,B}{4\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{2\,A\,b\,\text{Tan}[c+d\,x]}{3\,d}+\frac{2\,a\,B\,\text{Tan}[c+d\,x]}{3\,d}+\frac{A\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

### Problem 228: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 80 leaves, 4 steps):

$$b^2\,B\,x+\frac{\left(a^2\,A+2\,A\,b^2+4\,a\,b\,B\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{a\,(2\,A\,b+a\,B)\,\text{Tan}[c+d\,x]}{d}+\frac{a^2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 225 leaves):

$$\frac{1}{4\,d}\left(4\,b^2\,B\,c+4\,b^2\,B\,d\,x-2\,\left(a^2\,A+2\,A\,b^2+4\,a\,b\,B\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,a^2\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$4\,A\,b^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+8\,a\,b\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$\left.\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+4\,a\,(2\,A\,b+a\,B)\,\text{Tan}[c+d\,x]\right)$$

### Problem 230: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 156 leaves, 7 steps):

$$\frac{\left(3\,a^2\,A+4\,A\,b^2+8\,a\,b\,B\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{8\,d}+\frac{\left(4\,a\,A\,b+2\,a^2\,B+3\,b^2\,B\right)\,\text{Tan}[c+d\,x]}{3\,d}+$$
$$\frac{\left(3\,a^2\,A+4\,A\,b^2+8\,a\,b\,B\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{8\,d}+\frac{a\,(2\,A\,b+a\,B)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a^2\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 457 leaves):

$$\frac{1}{48\,d}\left(-6\,\left(3\,a^2\,A+4\,A\,b^2+8\,a\,b\,B\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+6\,\left(3\,a^2\,A+4\,A\,b^2+8\,a\,b\,B\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$\frac{3\,a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{12\,A\,b^2+8\,a\,b\,(A+3\,B)+a^2\,(9\,A+4\,B)}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{8\,a\,(2\,A\,b+a\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$
$$\frac{16\,\left(4\,a\,A\,b+2\,a^2\,B+3\,b^2\,B\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-\frac{3\,a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$
$$\left.\frac{8\,a\,(2\,A\,b+a\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{12\,A\,b^2+8\,a\,b\,(A+3\,B)+a^2\,(9\,A+4\,B)}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{16\,\left(4\,a\,A\,b+2\,a^2\,B+3\,b^2\,B\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

## Problem 236: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 124 leaves, 5 steps):

$$b^2\,(A\,b+3\,a\,B)\,x+\frac{a\,\left(a^2\,A+6\,A\,b^2+6\,a\,b\,B\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}-\frac{b^2\,(a\,A-2\,b\,B)\,\text{Sin}[c+d\,x]}{2\,d}+\frac{a^2\,(2\,A\,b+a\,B)\,\text{Tan}[c+d\,x]}{d}+\frac{a\,A\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 277 leaves):

$$\frac{1}{4\,d}\left(4\,b^2\,(A\,b+3\,a\,B)\,(c+d\,x)-2\,a\,\left(a^2\,A+6\,A\,b^2+6\,a\,b\,B\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,a\,\left(a^2\,A+6\,A\,b^2+6\,a\,b\,B\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{a^3\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,a^2\,(3\,A\,b+a\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-\frac{a^3\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,a^2\,(3\,A\,b+a\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+4\,b^3\,B\,\text{Sin}[c+d\,x]\right)$$

## Problem 237: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 145 leaves, 5 steps):

$$b^3\,B\,x+\frac{\left(3\,a^2\,A\,b+2\,A\,b^3+a^3\,B+6\,a\,b^2\,B\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{a\,\left(2\,a^2\,A+8\,A\,b^2+9\,a\,b\,B\right)\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a^2\,(5\,A\,b+3\,a\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{6\,d}+\frac{a\,A\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 392 leaves):

$$\frac{1}{12 d}\left(12 b^3 B (c+d x)-6 \left(3 a^2 A b+2 A b^3+a^3 B+6 a b^2 B\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\right.$$
$$6 \left(3 a^2 A b+2 A b^3+a^3 B+6 a b^2 B\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\frac{a^2 (9 A b+a (A+3 B))}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$
$$\frac{2 a^3 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{4 a \left(2 a^2 A+9 A b^2+9 a b B\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]}+$$
$$\left.\frac{2 a^3 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}-\frac{a^2 (9 A b+a (A+3 B))}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{4 a \left(2 a^2 A+9 A b^2+9 a b B\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]}\right)$$

- **Problem 238: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x])^3 (A+B \text{Cos}[c+d x]) \text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 188 leaves, 7 steps):

$$\frac{\left(3 a^3 A+12 a A b^2+12 a^2 b B+8 b^3 B\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+$$
$$\frac{\left(6 a^2 A b+3 A b^3+2 a^3 B+9 a b^2 B\right) \text{Tan}[c+d x]}{3 d}+\frac{a \left(3 a^2 A+10 A b^2+12 a b B\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{8 d}+$$
$$\frac{a^2 (3 A b+2 a B) \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{6 d}+\frac{a A (a+b \text{Cos}[c+d x])^2 \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{4 d}$$

Result (type 3, 639 leaves):

$$\frac{\left(-3 a^3 A-12 a A b^2-12 a^2 b B-8 b^3 B\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+$$
$$\frac{\left(3 a^3 A+12 a A b^2+12 a^2 b B+8 b^3 B\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+\frac{a^3 A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+$$
$$\frac{9 a^3 A+12 a^2 A b+36 a A b^2+4 a^3 B+36 a^2 b B}{48 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}-\frac{a^3 A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{-9 a^3 A-12 a^2 A b-36 a A b^2-4 a^3 B-36 a^2 b B}{48 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$
$$\frac{3 a^2 A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+a^3 B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{3 a^2 A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+a^3 B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$
$$\frac{6 a^2 A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 A b^3 \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+2 a^3 B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a b^2 B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$
$$\frac{6 a^2 A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 A b^3 \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+2 a^3 B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a b^2 B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}$$

- **Problem 246: Result more than twice size of optimal antiderivative.**

$$\int (a+b \,\text{Cos}[c+d x])^4 (A+B \,\text{Cos}[c+d x]) \,\text{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 198 leaves, 6 steps) :

$$b^3 (A b+4 a B) x+\frac{a \left(4 a^2 A b+8 A b^3+a^3 B+12 a b^2 B\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}-$$
$$\frac{b^2 \left(8 a A b+3 a^2 B-6 b^2 B\right) \text{Sin}[c+d x]}{6 d}+\frac{a^2 \left(2 a^2 A+9 A b^2+9 a b B\right) \text{Tan}[c+d x]}{3 d}+$$
$$\frac{a (2 A b+a B) (a+b \,\text{Cos}[c+d x])^2 \,\text{Sec}[c+d x] \,\text{Tan}[c+d x]}{2 d}+\frac{a A (a+b \,\text{Cos}[c+d x])^3 \,\text{Sec}[c+d x]^2 \,\text{Tan}[c+d x]}{3 d}$$

Result (type 3, 831 leaves) :

$$\frac{b^3 (A b+4 a B) (c+d x) \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4}{d (a+b \text{Cos}[c+d x])^4}+\frac{1}{2 d (a+b \text{Cos}[c+d x])^4}$$

$$\left(-4 a^3 A b-8 a A b^3-a^4 B-12 a^2 b^2 B\right) \text{Cos}[c+d x]^4 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right] (b+a \text{Sec}[c+d x])^4+$$

$$\frac{1}{2 d (a+b \text{Cos}[c+d x])^4}\left(4 a^3 A b+8 a A b^3+a^4 B+12 a^2 b^2 B\right) \text{Cos}[c+d x]^4 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right] (b+a \text{Sec}[c+d x])^4+$$

$$\frac{\left(a^4 A+12 a^3 A b+3 a^4 B\right) \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4}{12 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{a^4 A \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$

$$\frac{a^4 A \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{\left(-a^4 A-12 a^3 A b-3 a^4 B\right) \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4}{12 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\left(2 \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \left(a^4 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a^2 A b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+6 a^3 b B \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right) \Big/$$

$$\left(3 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)+$$

$$\left(2 \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \left(a^4 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a^2 A b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+6 a^3 b B \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right) \Big/$$

$$\left(3 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)+\frac{b^4 B \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}[c+d x]}{d (a+b \text{Cos}[c+d x])^4}$$

- **Problem 256: Result more than twice size of optimal antiderivative.**

$$\int \frac{(A+B \text{Cos}[c+d x]) \text{Sec}[c+d x]^3}{a+b \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 143 leaves, 6 steps):

$$-\frac{2 b^2 (A b-a B) \text{ArcTan}\left[\frac{\sqrt{a-b} \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{a^3 \sqrt{a-b} \sqrt{a+b} d}+\frac{\left(a^2 A+2 A b^2-2 a b B\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a^3 d}-\frac{(A b-a B) \text{Tan}[c+d x]}{a^2 d}+\frac{A \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a d}$$

Result (type 3, 300 leaves):

$$\frac{1}{4 a^3 d}\left(\frac{8 b^2 (A b - a B) \operatorname{ArcTanh}\left[\frac{(a-b) \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{-a^2+b^2}}\right]}{\sqrt{-a^2+b^2}} - 2 \left(a^2 A + 2 A b^2 - 2 a b B\right) \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right] + \right.$$

$$2 \left(a^2 A + 2 A b^2 - 2 a b B\right) \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right] + \frac{a^2 A}{\left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} +$$

$$\left.\frac{4 a (-A b + a B) \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]} - \frac{a^2 A}{\left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} + \frac{4 a (-A b + a B) \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}\right)$$

- **Problem 257: Result more than twice size of optimal antiderivative.**

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^4}{a + b \operatorname{Cos}[c + d x]} \, dx$$

Optimal (type 3, 187 leaves, 7 steps):

$$\frac{2 b^3 (A b - a B) \operatorname{ArcTan}\left[\frac{\sqrt{a-b} \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{a^4 \sqrt{a-b} \sqrt{a+b} d} - \frac{\left(a^2 + 2 b^2\right) (A b - a B) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 a^4 d} +$$

$$\frac{\left(2 a^2 A + 3 A b^2 - 3 a b B\right) \operatorname{Tan}[c + d x]}{3 a^3 d} - \frac{(A b - a B) \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 a^2 d} + \frac{A \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{3 a d}$$

Result (type 3, 422 leaves):

$$\frac{1}{12\,a^4\,d}\left(\frac{24\,b^3\,(-A\,b+a\,B)\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{\sqrt{-a^2+b^2}}-6\,\left(a^2+2\,b^2\right)\,(-A\,b+a\,B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$

$$6\,\left(a^2+2\,b^2\right)\,(-A\,b+a\,B)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{a^2\,(-3\,A\,b+a\,(A+3\,B))}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{2\,a^3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{4\,a\,\left(2\,a^2\,A+3\,A\,b^2-3\,a\,b\,B\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+$$

$$\left.\frac{2\,a^3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{a^2\,(-3\,A\,b+a\,(A+3\,B))}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,a\,\left(2\,a^2\,A+3\,A\,b^2-3\,a\,b\,B\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 273: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^4\,(A+B\,\text{Cos}[c+d\,x])}{(a+b\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 409 leaves, 7 steps) :

$$\frac{(A\,b-4\,a\,B)\,x}{b^5}-\frac{1}{(a-b)^{7/2}\,b^5\,(a+b)^{7/2}\,d}$$

$$a\,\left(2\,a^6\,A\,b-7\,a^4\,A\,b^3+8\,a^2\,A\,b^5-8\,A\,b^7-8\,a^7\,B+28\,a^5\,b^2\,B-35\,a^3\,b^4\,B+20\,a\,b^6\,B\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]-$$

$$\frac{\left(3\,a^3\,A\,b-8\,a\,A\,b^3-12\,a^4\,B+23\,a^2\,b^2\,B-6\,b^4\,B\right)\,\text{Sin}[c+d\,x]}{6\,b^4\,\left(a^2-b^2\right)^2\,d}+\frac{a\,(A\,b-a\,B)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^3}+$$

$$\frac{a\,\left(a^2\,A\,b-6\,A\,b^3-4\,a^3\,B+9\,a\,b^2\,B\right)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{6\,b^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{a^2\,\left(a^4\,A\,b-2\,a^2\,A\,b^3+6\,A\,b^5-4\,a^5\,B+11\,a^3\,b^2\,B-12\,a\,b^4\,B\right)\,\text{Sin}[c+d\,x]}{2\,b^4\,\left(a^2-b^2\right)^3\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 1278 leaves) :

$$-\frac{1}{b^5\left(a^2-b^2\right)^3\sqrt{-a^2+b^2}\ d}a\left(-2a^6Ab+7a^4Ab^3-8a^2Ab^5+8Ab^7+8a^7B-28a^5b^2B+35a^3b^4B-20ab^6B\right)\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{-a^2+b^2}}\right]+$$

$$\frac{1}{24b^5\left(-a^2+b^2\right)^3 d\,(a+b\,\text{Cos}[c+dx])^3}$$

$$\Big(-24a^9Ab(c+dx)+36a^7Ab^3(c+dx)+36a^5Ab^5(c+dx)-84a^3Ab^7(c+dx)+36aAb^9(c+dx)+96a^{10}B(c+dx)-144a^8b^2B(c+dx)-$$
$$144a^6b^4B(c+dx)+336a^4b^6B(c+dx)-144a^2b^8B(c+dx)-72a^8Ab^2(c+dx)\text{Cos}[c+dx]+198a^6Ab^4(c+dx)\text{Cos}[c+dx]-$$
$$162a^4Ab^6(c+dx)\text{Cos}[c+dx]+18a^2Ab^8(c+dx)\text{Cos}[c+dx]+18Ab^{10}(c+dx)\text{Cos}[c+dx]+288a^9bB(c+dx)\text{Cos}[c+dx]-$$
$$792a^7b^3B(c+dx)\text{Cos}[c+dx]+648a^5b^5B(c+dx)\text{Cos}[c+dx]-72a^3b^7B(c+dx)\text{Cos}[c+dx]-72ab^9B(c+dx)\text{Cos}[c+dx]-$$
$$36a^7Ab^3(c+dx)\text{Cos}[2(c+dx)]+108a^5Ab^5(c+dx)\text{Cos}[2(c+dx)]-108a^3Ab^7(c+dx)\text{Cos}[2(c+dx)]+$$
$$36aAb^9(c+dx)\text{Cos}[2(c+dx)]+144a^8b^2B(c+dx)\text{Cos}[2(c+dx)]-432a^6b^4B(c+dx)\text{Cos}[2(c+dx)]+$$
$$432a^4b^6B(c+dx)\text{Cos}[2(c+dx)]-144a^2b^8B(c+dx)\text{Cos}[2(c+dx)]-6a^6Ab^4(c+dx)\text{Cos}[3(c+dx)]+$$
$$18a^4Ab^6(c+dx)\text{Cos}[3(c+dx)]-18a^2Ab^8(c+dx)\text{Cos}[3(c+dx)]+6Ab^{10}(c+dx)\text{Cos}[3(c+dx)]+24a^7b^3B(c+dx)\text{Cos}[3(c+dx)]-$$
$$72a^5b^5B(c+dx)\text{Cos}[3(c+dx)]+72a^3b^7B(c+dx)\text{Cos}[3(c+dx)]-24ab^9B(c+dx)\text{Cos}[3(c+dx)]+24a^8Ab^2\text{Sin}[c+dx]-$$
$$57a^6Ab^4\text{Sin}[c+dx]+72a^4Ab^6\text{Sin}[c+dx]+36a^2Ab^8\text{Sin}[c+dx]-96a^9bB\text{Sin}[c+dx]+228a^7b^3B\text{Sin}[c+dx]-$$
$$135a^5b^5B\text{Sin}[c+dx]-90a^3b^7B\text{Sin}[c+dx]+18ab^9B\text{Sin}[c+dx]+30a^7Ab^3\text{Sin}[2(c+dx)]-90a^5Ab^5\text{Sin}[2(c+dx)]+$$
$$120a^3Ab^7\text{Sin}[2(c+dx)]-120a^8b^2B\text{Sin}[2(c+dx)]+336a^6b^4B\text{Sin}[2(c+dx)]-300a^4b^6B\text{Sin}[2(c+dx)]+$$
$$18a^2b^8B\text{Sin}[2(c+dx)]+6b^{10}B\text{Sin}[2(c+dx)]+11a^6Ab^4\text{Sin}[3(c+dx)]-32a^4Ab^6\text{Sin}[3(c+dx)]+$$
$$36a^2Ab^8\text{Sin}[3(c+dx)]-44a^7b^3B\text{Sin}[3(c+dx)]+125a^5b^5B\text{Sin}[3(c+dx)]-114a^3b^7B\text{Sin}[3(c+dx)]+$$
$$18ab^9B\text{Sin}[3(c+dx)]-3a^6b^4B\text{Sin}[4(c+dx)]+9a^4b^6B\text{Sin}[4(c+dx)]-9a^2b^8B\text{Sin}[4(c+dx)]+3b^{10}B\text{Sin}[4(c+dx)]\Big)$$

- **Problem 274: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+dx]^3\,(A+B\,\text{Cos}[c+dx])}{(a+b\,\text{Cos}[c+dx])^4}\,dx$$

Optimal (type 3, 301 leaves, 6 steps):

$$\frac{Bx}{b^4}-\frac{\left(3a^2Ab^5+2Ab^7+2a^7B-7a^5b^2B+8a^3b^4B-8ab^6B\right)\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{a+b}}\right]}{(a-b)^{7/2}b^4(a+b)^{7/2}d}+\frac{a(Ab-aB)\text{Cos}[c+dx]^2\text{Sin}[c+dx]}{3b\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+dx])^3}+$$
$$\frac{a^2\left(5Ab^3+3a^3B-8ab^2B\right)\text{Sin}[c+dx]}{6b^3\left(a^2-b^2\right)^2d\,(a+b\,\text{Cos}[c+dx])^2}-\frac{a\left(a^2Ab^3-16Ab^5+9a^5B-28a^3b^2B+34ab^4B\right)\text{Sin}[c+dx]}{6b^3\left(a^2-b^2\right)^3d\,(a+b\,\text{Cos}[c+dx])}$$

Result (type 3, 717 leaves):

$$\frac{1}{24 b^4 d}\left(-\frac{24 \left(3 a^2 A b^5+2 A b^7+2 a^7 B-7 a^5 b^2 B+8 a^3 b^4 B-8 a b^6 B\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{-a^2+b^2}}\right]}{\left(-a^2+b^2\right)^{7/2}}+\right.$$

$$\frac{1}{\left(a^2-b^2\right)^3 (a+b \text{Cos}[c+d x])^3}\Big(24 a^9 B c-36 a^7 b^2 B c-36 a^5 b^4 B c+84 a^3 b^6 B c-36 a b^8 B c+24 a^9 B d x-36 a^7 b^2 B d x-36 a^5 b^4 B d x+$$
$$84 a^3 b^6 B d x-36 a b^8 B d x+18 b \left(a^2-b^2\right)^3 \left(4 a^2+b^2\right) B (c+d x) \text{Cos}[c+d x]+36 a b^2 \left(a^2-b^2\right)^3 B (c+d x) \text{Cos}[2 (c+d x)]+$$
$$6 a^6 b^3 B c \text{Cos}[3 (c+d x)]-18 a^4 b^5 B c \text{Cos}[3 (c+d x)]+18 a^2 b^7 B c \text{Cos}[3 (c+d x)]-6 b^9 B c \text{Cos}[3 (c+d x)]+$$
$$6 a^6 b^3 B d x \text{Cos}[3 (c+d x)]-18 a^4 b^5 B d x \text{Cos}[3 (c+d x)]+18 a^2 b^7 B d x \text{Cos}[3 (c+d x)]-6 b^9 B d x \text{Cos}[3 (c+d x)]+$$
$$18 a^5 A b^4 \text{Sin}[c+d x]+39 a^3 A b^6 \text{Sin}[c+d x]+18 a A b^8 \text{Sin}[c+d x]-24 a^8 b B \text{Sin}[c+d x]+57 a^6 b^3 B \text{Sin}[c+d x]-$$
$$72 a^4 b^5 B \text{Sin}[c+d x]-36 a^2 b^7 B \text{Sin}[c+d x]+6 a^4 A b^5 \text{Sin}[2 (c+d x)]+54 a^2 A b^7 \text{Sin}[2 (c+d x)]-30 a^7 b^2 B \text{Sin}[2 (c+d x)]+$$
$$90 a^5 b^4 B \text{Sin}[2 (c+d x)]-120 a^3 b^6 B \text{Sin}[2 (c+d x)]+2 a^5 A b^4 \text{Sin}[3 (c+d x)]-5 a^3 A b^6 \text{Sin}[3 (c+d x)]+$$
$$\left.18 a A b^8 \text{Sin}[3 (c+d x)]-11 a^6 b^3 B \text{Sin}[3 (c+d x)]+32 a^4 b^5 B \text{Sin}[3 (c+d x)]-36 a^2 b^7 B \text{Sin}[3 (c+d x)]\Big)\right)$$

- **Problem 283: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d x] (a B+b B \text{Cos}[c+d x])}{a+b \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 11 leaves, 2 steps):

$$\frac{B \text{Sin}[c+d x]}{d}$$

Result (type 3, 23 leaves):

$$B \left(\frac{\text{Cos}[d x] \text{Sin}[c]}{d}+\frac{\text{Cos}[c] \text{Sin}[d x]}{d}\right)$$

- **Problem 285: Result more than twice size of optimal antiderivative.**

$$\int \frac{(a B+b B \text{Cos}[c+d x]) \text{Sec}[c+d x]}{a+b \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 12 leaves, 2 steps):

$$\frac{B \text{ArcTanh}[\text{Sin}[c+d x]]}{d}$$

Result (type 3, 70 leaves):

$$B\left(-\frac{\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}\right)$$

- **Problem 301: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b\,\text{Cos}[c+d x]}\,(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^2\,dx$$

Optimal (type 4, 213 leaves, 9 steps):

$$-\frac{A\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{d\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}}+\frac{(a A+2 b B)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{d\sqrt{a+b\,\text{Cos}[c+d x]}}+$$

$$\frac{(A b+2 a B)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{d\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{A\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Tan}[c+d x]}{d}$$

Result (type 4, 484 leaves):

$$\frac{1}{4\,d}\left(\frac{8\,b\,B\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}+\right.$$

$$\frac{2\,(A\,b+4\,a\,B)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}+\left(2\,\mathrm{i}\,A\,b\,\sqrt{\frac{b-b\,Cos[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,Cos[c+d\,x]}{a-b}}\;Cos[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,EllipticE\left[\mathrm{i}\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,EllipticF\left[\mathrm{i}\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,EllipticPi\left[\frac{a+b}{a},\,\mathrm{i}\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,Sin[c+d\,x]\right)\Big/$$

$$\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-Cos[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,Cos[c+d\,x])+(a+b\,Cos[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,Cos[c+d\,x])+2\,(a+b\,Cos[c+d\,x])^2\right)\right)\right)+\frac{A\,\sqrt{a+b\,Cos[c+d\,x]}\;Tan[c+d\,x]}{d}$$

- **Problem 302: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,Cos[c+d\,x]}\;(A+B\,Cos[c+d\,x])\;Sec[c+d\,x]^3\,dx$$

Optimal (type 4, 292 leaves, 10 steps):

$$-\frac{(A b+4 a B)\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{4 a d\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}}+$$

$$\frac{(3 A b+4 a B)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{4 d\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{\left(4 a^2 A-A b^2+4 a b B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{4 a d\sqrt{a+b\,\text{Cos}[c+d x]}}+$$

$$\frac{(A b+4 a B)\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Tan}[c+d x]}{4 a d}+\frac{A\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]\ \text{Tan}[c+d x]}{2 d}$$

Result (type 4, 552 leaves) :

$$\frac{1}{16 a d}\left(\frac{8 a A b\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{2\left(8 a^2 A-3 A b^2+4 a b B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d x]}}-\right.$$

$$\left(2\,i\left(-A b^2-4 a b B\right)\sqrt{\frac{b-b\,\text{Cos}[c+d x]}{a+b}}\sqrt{-\frac{b+b\,\text{Cos}[c+d x]}{a-b}}\ \text{Cos}[2(c+d x)]\right.$$

$$\left(2 a(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(2 a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\text{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b\,\text{Cos}[c+d x])+(a+b\,\text{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a(a+b\,\text{Cos}[c+d x])+2(a+b\,\text{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\left(\frac{\text{Sec}[c+d x]\,(A b\,\text{Sin}[c+d x]+4 a B\,\text{Sin}[c+d x])}{4 a}+\frac{1}{2}A\,\text{Sec}[c+d x]\ \text{Tan}[c+d x]\right)}{d}$$

- **Problem 303: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,\text{Cos}[c+d x]}\ (A+B\,\text{Cos}[c+d x])\ \text{Sec}[c+d x]^4\,dx$$

Optimal (type 4, 378 leaves, 11 steps) :

$$-\frac{\left(16 a^2 A-3 A b^2+6 a b B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 a^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{\left(16 a^2 A-A b^2+18 a b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(4 a^2 A b+A b^3+8 a^3 B-2 a b^2 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{8 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(16 a^2 A-3 A b^2+6 a b B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{24 a^2 d}+$$

$$\frac{(A b+6 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 a d}+\frac{A \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 635 leaves) :

$$\frac{1}{96\,a^2\,d}\left(\frac{2\left(4\,a\,A\,b^2+24\,a^2\,b\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(8\,a^2\,A\,b+9\,A\,b^3+48\,a^3\,B-18\,a\,b^2\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-16\,a^2\,A\,b+3\,A\,b^3-6\,a\,b^2\,B\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{\mathrm{Sec}[c+d\,x]^2\,(A\,b\,\mathrm{Sin}[c+d\,x]+6\,a\,B\,\mathrm{Sin}[c+d\,x])}{12\,a}+\right.$$

$$\left.\frac{\mathrm{Sec}[c+d\,x]\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]-3\,A\,b^2\,\mathrm{Sin}[c+d\,x]+6\,a\,b\,B\,\mathrm{Sin}[c+d\,x]\right)}{24\,a^2}+\frac{1}{3}\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

## Problem 307: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 4, 236 leaves, 9 steps) :

$$\frac{2\,(3\,A\,b+4\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{2\,\left(3\,a\,A\,b-a^2\,B+b^2\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^2\,A\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,b\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 406 leaves) :

$$\frac{1}{6\,d}\left(\frac{4\,\left(6\,a\,A\,b+3\,a^2\,B+b^2\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(6\,a^2\,A+3\,A\,b^2+4\,a\,b\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{1}{a\,b\,\sqrt{-\frac{1}{a+b}}}2\,\mathrm{i}\,(3\,A\,b+4\,a\,B)\,\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\,\sqrt{\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{-a+b}}\;\mathrm{Csc}[c+d\,x]$$

$$\left(-2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\,\left(-2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]+b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)+4\,b\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]\right)$$

- **Problem 308: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 232 leaves, 9 steps) :

$$-\frac{(a A-2 b B)\sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{\left(a^2 A+2 A b^2+2 a b B\right)\sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{a (3 A b+2 a B)\sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{a A \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]}{d}$$

Result (type 4, 398 leaves) :

$$\frac{1}{4 d}\left(\frac{8 b (A b+2 a B)\sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\right.$$

$$\frac{2\left(5 a A b+4 a^2 B+2 b^2 B\right)\sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{a b \sqrt{-\frac{1}{a+b}}} 2 \mathrm{i} (-a A+2 b B)\sqrt{-\frac{b(-1+\operatorname{Cos}[c+d x])}{a+b}}$$

$$\sqrt{\frac{b(1+\operatorname{Cos}[c+d x])}{-a+b}}\ \operatorname{Csc}[c+d x]\left(-2 a (a-b) \operatorname{EllipticE}\left[\mathrm{i} \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+\right.$$

$$b\left(-2 a \operatorname{EllipticF}\left[\mathrm{i} \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+\right.$$

$$\left.\left.\left. b \operatorname{EllipticPi}\left[\frac{a+b}{a}, \mathrm{i} \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right)+4 a A \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]\right)$$

- **Problem 309: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b \operatorname{Cos}[c+d x])^{3/2} (A+B \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]^3 \, dx$$

Optimal (type 4, 295 leaves, 10 steps) :

$$-\frac{(5 A b+4 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(7 a A b+4 a^2 B+8 b^2 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(4 a^2 A+3 A b^2+12 a b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{(5 A b+4 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{4 d}+\frac{a A \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 4, 556 leaves):

$$\frac{1}{16 d}\left(\frac{2\left(4 a A b+16 b^2 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2\left(8 a^2 A+A b^2+20 a b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\right.$$

$$\left(2 i\left(-5 A b^2-4 a b B\right) \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2(c+d x)]\right.$$

$$\left(2 a(a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b\left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\Bigg) \Bigg/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a(a+b \operatorname{Cos}[c+d x])+2(a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d} \sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{1}{4} \operatorname{Sec}[c+d x](5 A b \operatorname{Sin}[c+d x]+4 a B \operatorname{Sin}[c+d x])+\frac{1}{2} a A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]\right)$$

- **Problem 310: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b \operatorname{Cos}[c+d x])^{3/2}(A+B \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]^4 \, dx$$

Optimal (type 4, 375 leaves, 11 steps) :

$$-\frac{\left(16\,a^2\,A+3\,A\,b^2+30\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,a\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(16\,a^2\,A+17\,A\,b^2+42\,a\,b\,B\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(12\,a^2\,A\,b-A\,b^3+8\,a^3\,B+6\,a\,b^2\,B\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{8\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\left(16\,a^2\,A+3\,A\,b^2+30\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{24\,a\,d}+$$

$$\frac{(7\,A\,b+6\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\;\text{Tan}[c+d\,x]}{12\,d}+\frac{a\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^2\;\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 4, 634 leaves) :

$$\frac{1}{96\,a\,d}\left(\frac{2\left(28\,a\,A\,b^2+24\,a^2\,b\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(56\,a^2\,A\,b-9\,A\,b^3+48\,a^3\,B+6\,a\,b^2\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\,\left(-16\,a^2\,A\,b-3\,A\,b^3-30\,a\,b^2\,B\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{12}\,\mathrm{Sec}[c+d\,x]^2\,(7\,A\,b\,\mathrm{Sin}[c+d\,x]+6\,a\,B\,\mathrm{Sin}[c+d\,x])+\right.$$

$$\left.\frac{\mathrm{Sec}[c+d\,x]\,\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]+3\,A\,b^2\,\mathrm{Sin}[c+d\,x]+30\,a\,b\,B\,\mathrm{Sin}[c+d\,x]\right)}{24\,a}+\frac{1}{3}\,a\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 314: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 4, 292 leaves, 10 steps):

$$\frac{2\left(35\,a\,A\,b+23\,a^2\,B+9\,b^2\,B\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{2\left(10\,a^2\,A\,b+5\,A\,b^3-8\,a^3\,B+8\,a\,b^2\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,a^3\,A\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,b\,(5\,A\,b+8\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,b\,B\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 4, 453 leaves) :

$$\frac{1}{30\,d}\left(\frac{4\left(45\,a^2\,A\,b+5\,A\,b^3+15\,a^3\,B+17\,a\,b^2\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(30\,a^3\,A+35\,a\,A\,b^2+23\,a^2\,b\,B+9\,b^3\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{1}{a\,b\,\sqrt{-\frac{1}{a+b}}}\,2\,i\,\left(35\,a\,A\,b+23\,a^2\,B+9\,b^2\,B\right)\sqrt{-\frac{b\,(-1+\text{Cos}[c+d\,x])}{a+b}}\;\sqrt{-\frac{b\,(1+\text{Cos}[c+d\,x])}{a-b}}$$

$$\text{Csc}[c+d\,x]\left(-2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(-2\,a\,\text{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.\left.i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)+$$

$$\left.4\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;(5\,A\,b+11\,a\,B+3\,b\,B\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]\right)$$

## Problem 315: Result unnecessarily involves imaginary or complex numbers.

$$\int (a + b \cos[c + d x])^{5/2} (A + B \cos[c + d x]) \sec[c + d x]^2 \, dx$$

Optimal (type 4, 296 leaves, 10 steps):

$$-\frac{\left(3 a^2 A - 6 A b^2 - 14 a b B\right) \sqrt{a + b \cos[c + d x]} \, \text{EllipticE}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{3 d \sqrt{\frac{a+b \cos[c+d x]}{a+b}}} + \frac{\left(3 a^3 A + 12 a A b^2 + 4 a^2 b B + 2 b^3 B\right) \sqrt{\frac{a+b \cos[c+d x]}{a+b}} \, \text{EllipticF}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{3 d \sqrt{a + b \cos[c + d x]}} + \frac{a^2 (5 A b + 2 a B) \sqrt{\frac{a+b \cos[c+d x]}{a+b}} \, \text{EllipticPi}\left[2, \frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{d \sqrt{a + b \cos[c + d x]}} - \frac{b (3 a A - 2 b B) \sqrt{a + b \cos[c + d x]} \sin[c + d x]}{3 d} + \frac{a A (a + b \cos[c + d x])^{3/2} \tan[c + d x]}{d}$$

Result (type 4, 560 leaves):

$$\frac{1}{12\,d}\left(\frac{2\left(36\,a\,A\,b^2+36\,a^2\,b\,B+4\,b^3\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(27\,a^2\,A\,b+6\,A\,b^3+12\,a^3\,B+14\,a\,b^2\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\left(-3\,a^2\,A\,b+6\,A\,b^3+14\,a\,b^2\,B\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2}{3}\,b^2\,B\,\mathrm{Sin}[c+d\,x]+a^2\,A\,\mathrm{Tan}[c+d\,x]\right)}{d}$$

- **Problem 316: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 315 leaves, 10 steps) :

$$-\frac{\left(9\,a\,A\,b+4\,a^2\,B-8\,b^2\,B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(11\,a^2\,A\,b+8\,A\,b^3+4\,a^3\,B+16\,a\,b^2\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a\,\left(4\,a^2\,A+15\,A\,b^2+20\,a\,b\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a\,(7\,A\,b+4\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{a\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 589 leaves) :

$$\frac{1}{16\,d}\left(\frac{2\left(4 a^2 A b+16 A b^3+48 a b^2 B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d x]}}+\right.$$

$$\frac{2\left(8 a^3 A+21 a A b^2+36 a^2 b B+8 b^3 B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d x]}}-$$

$$\left(2\,\mathrm{i}\left(-9 a A b^2-4 a^2 b B+8 b^3 B\right)\sqrt{\frac{b-b\,\text{Cos}[c+d x]}{a+b}}\ \sqrt{-\frac{b+b\,\text{Cos}[c+d x]}{a-b}}\ \text{Cos}[2(c+d x)]\right.$$

$$\left(2 a(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(2 a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\ \sqrt{1-\text{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b\,\text{Cos}[c+d x])+(a+b\,\text{Cos}[c+d x])^2}{b^2}}\ \left(2 a^2-b^2-4 a(a+b\,\text{Cos}[c+d x])+2(a+b\,\text{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d x]}\ \left(\frac{1}{4}\text{Sec}[c+d x]\left(9 a A b\,\text{Sin}[c+d x]+4 a^2 B\,\text{Sin}[c+d x]\right)+\frac{1}{2}a^2 A\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]\right)$$

- **Problem 317: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d x])^{5/2}(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^4\,dx$$

Optimal (type 4, 376 leaves, 11 steps) :

$$-\frac{\left(16 a^2 A+33 A b^2+54 a b B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(16 a^3 A+59 a A b^2+66 a^2 b B+48 b^3 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(20 a^2 A b+5 A b^3+8 a^3 B+30 a b^2 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{8 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(16 a^2 A+33 A b^2+54 a b B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{24 d}+$$

$$\frac{a(3 A b+2 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{4 d}+\frac{a A(a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 639 leaves) :

$$\frac{1}{96\,d}\left(\frac{2\left(52\,a\,A\,b^2+24\,a^2\,b\,B+96\,b^3\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(104\,a^2\,A\,b-3\,A\,b^3+48\,a^3\,B+126\,a\,b^2\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-16\,a^2\,A\,b-33\,A\,b^3-54\,a\,b^2\,B\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{12}\,\mathrm{Sec}[c+d\,x]^2\,\left(13\,a\,A\,b\,\mathrm{Sin}[c+d\,x]+6\,a^2\,B\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\left.\frac{1}{24}\,\mathrm{Sec}[c+d\,x]\,\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]+33\,A\,b^2\,\mathrm{Sin}[c+d\,x]+54\,a\,b\,B\,\mathrm{Sin}[c+d\,x]\right)+\frac{1}{3}\,a^2\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 318: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 4, 465 leaves, 12 steps) :

$$-\frac{\left(284 a^2 A b+15 A b^3+128 a^3 B+264 a b^2 B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{192 a d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(356 a^2 A b+133 A b^3+128 a^3 B+472 a b^2 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{192 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(48 a^4 A+120 a^2 A b^2-5 A b^4+160 a^3 b B+40 a b^3 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{64 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(284 a^2 A b+15 A b^3+128 a^3 B+264 a b^2 B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{192 a d}+$$

$$\frac{\left(36 a^2 A+59 A b^2+104 a b B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{96 d}+$$

$$\frac{a (11 A b+8 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{24 d}+\frac{a A (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{4 d}$$

Result (type 4, 729 leaves) :

$$\frac{1}{768\,a\,d}\left(\frac{2\left(144\,a^3\,A\,b+236\,a\,A\,b^3+416\,a^2\,b^2\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right.$$

$$2\left(288\,a^4\,A+436\,a^2\,A\,b^2-45\,A\,b^4+832\,a^3\,b\,B-24\,a\,b^3\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,\mathrm{i}\left(-284\,a^2\,A\,b^2-15\,A\,b^4-128\,a^3\,b\,B-264\,a\,b^3\,B\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{1}{24}\,\text{Sec}[c+d\,x]^3\,\left(17\,a\,A\,b\,\text{Sin}[c+d\,x]+8\,a^2\,B\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\frac{1}{96}\,\text{Sec}[c+d\,x]^2\,\left(36\,a^2\,A\,\text{Sin}[c+d\,x]+59\,A\,b^2\,\text{Sin}[c+d\,x]+104\,a\,b\,B\,\text{Sin}[c+d\,x]\right)+$$

$$1/(192\,a)\,\text{Sec}[c+d\,x]\,\left(284\,a^2\,A\,b\,\text{Sin}[c+d\,x]+15\,A\,b^3\,\text{Sin}[c+d\,x]+128\,a^3\,B\,\text{Sin}[c+d\,x]+264\,a\,b^2\,B\,\text{Sin}[c+d\,x]\right)+$$

$$\left.\frac{1}{4}\,a^2\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 324: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 216 leaves, 9 steps) :

$$-\frac{A\sqrt{a+b\operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{a d\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{a+b}}}+\frac{A\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{d\sqrt{a+b\operatorname{Cos}[c+d x]}}-\frac{(A b-2 a B)\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{a d\sqrt{a+b\operatorname{Cos}[c+d x]}}+\frac{A\sqrt{a+b\operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]}{a d}$$

Result (type 4, 320 leaves) :

$$\frac{1}{4 a d}\left(\frac{2(-3 A b+4 a B)\sqrt{\frac{a+b\operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\operatorname{Cos}[c+d x]}}-1\Big/\left(a b\sqrt{-\frac{1}{a+b}}\right)2\,\mathrm{i}\,A\sqrt{-\frac{b(-1+\operatorname{Cos}[c+d x])}{a+b}}\sqrt{\frac{b(1+\operatorname{Cos}[c+d x])}{-a+b}}\operatorname{Csc}[c+d x]\left(-2 a(a-b)\operatorname{EllipticE}\left[\mathrm{i}\operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\operatorname{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(-2 a\operatorname{EllipticF}\left[\mathrm{i}\operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\operatorname{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\operatorname{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\operatorname{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)+4 A\sqrt{a+b\operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]\right)$$

## Problem 325: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{(A+B\operatorname{Cos}[c+d x])\operatorname{Sec}[c+d x]^3}{\sqrt{a+b\operatorname{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 299 leaves, 10 steps) :

$$\frac{(3\,A\,b-4\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{(A\,b-4\,a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\left(4\,a^2\,A+3\,A\,b^2-4\,a\,b\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{(3\,A\,b-4\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{4\,a^2\,d}+\frac{A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]\;\mathrm{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 4, 556 leaves) :

$$\frac{1}{16\,a^2\,d}\left(\frac{8\,a\,A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(8\,a^2\,A+9\,A\,b^2-12\,a\,b\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,i\,\left(3\,A\,b^2-4\,a\,b\,B\right)\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{\mathrm{Sec}[c+d\,x]\,(-3\,A\,b\,\mathrm{Sin}[c+d\,x]+4\,a\,B\,\mathrm{Sin}[c+d\,x])}{4\,a^2}+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a}\right)}{d}$$

■ **Problem 330: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 190 leaves, 7 steps):

$$-\frac{2\,(A\,b-a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{2\,A\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,b\,(A\,b-a\,B)\,\mathrm{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 614 leaves):

$$-\frac{2\,\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])\,\left(-A\,b^2\,\mathrm{Sin}[c+d\,x]+a\,b\,B\,\mathrm{Sin}[c+d\,x]\right)}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,(A+B\,\mathrm{Cos}[c+d\,x])}-$$
$$\frac{1}{2\,a\,(-a+b)\,(a+b)\,d\,(A+B\,\mathrm{Cos}[c+d\,x])}\mathrm{Cos}[c+d\,x]\,(B+A\,\mathrm{Sec}[c+d\,x])$$
$$\left(\frac{2\,\left(-2\,a\,A\,b+2\,a^2\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(2\,a^2\,A-3\,A\,b^2+a\,b\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\right.$$
$$\left(2\,i\,\left(-A\,b^2+a\,b\,B\right)\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$
$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$
$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\right.$$
$$\left.\left.\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)$$

- **Problem 331: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(A + B\,\mathrm{Cos}[c + d\,x])\,\mathrm{Sec}[c + d\,x]^2}{(a + b\,\mathrm{Cos}[c + d\,x])^{3/2}}\,dx$$

Optimal (type 4, 303 leaves, 10 steps):

$$-\frac{\left(a^2 A - 3 A b^2 + 2 a b B\right)\sqrt{a + b\,\mathrm{Cos}[c + d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c + d\,x),\frac{2 b}{a+b}\right]}{a^2\left(a^2 - b^2\right) d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}} + \frac{A\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c + d\,x),\frac{2 b}{a+b}\right]}{a\,d\sqrt{a + b\,\mathrm{Cos}[c + d\,x]}} -$$

$$\frac{(3 A b - 2 a B)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c + d\,x),\frac{2 b}{a+b}\right]}{a^2\,d\sqrt{a + b\,\mathrm{Cos}[c + d\,x]}} + \frac{b\left(a^2 A - 3 A b^2 + 2 a b B\right)\mathrm{Sin}[c + d\,x]}{a^2\left(a^2 - b^2\right) d\sqrt{a + b\,\mathrm{Cos}[c + d\,x]}} + \frac{A\,\mathrm{Tan}[c + d\,x]}{a\,d\sqrt{a + b\,\mathrm{Cos}[c + d\,x]}}$$

Result (type 4, 608 leaves):

$$\frac{1}{4 a^2 (a-b)(a+b) d}\left(\frac{2\left(4 a A b^2-4 a^2 b B\right)\sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\right.$$

$$\frac{2\left(-7 a^2 A b+9 A b^3+4 a^3 B-6 a b^2 B\right)\sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\left(2 i\left(-a^2 A b+3 A b^3-2 a b^2 B\right)\sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}}\sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}}\ \operatorname{Cos}[2(c+d x)]\right.$$

$$\left(2 a (a-b)\ \text{EllipticE}\left[i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b \operatorname{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(2 a\ \text{EllipticF}\left[i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\ \text{EllipticPi}\left[\frac{a+b}{a},i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b \operatorname{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)\operatorname{Sin}[c+d x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\operatorname{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a (a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a (a+b \operatorname{Cos}[c+d x])+2 (a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{2\left(-A b^3 \operatorname{Sin}[c+d x]+a b^2 B \operatorname{Sin}[c+d x]\right)}{a^2\left(a^2-b^2\right)(a+b \operatorname{Cos}[c+d x])}+\frac{A \operatorname{Tan}[c+d x]}{a^2}\right)}{d}$$

- **Problem 332: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{(A+B \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]^3}{(a+b \operatorname{Cos}[c+d x])^{3/2}}\, dx$$

Optimal (type 4, 398 leaves, 11 steps):

$$\frac{\left(7 a^2 A b-15 A b^3-4 a^3 B+12 a b^2 B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^3\left(a^2-b^2\right) d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}-$$

$$\frac{(5 A b-4 a B) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(4 a^2 A+15 A b^2-12 a b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^3 d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{b\left(7 a^2 A b-15 A b^3-4 a^3 B+12 a b^2 B\right) \operatorname{Sin}[c+d x]}{4 a^3\left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{(5 A b-4 a B) \operatorname{Tan}[c+d x]}{4 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

Result (type 4, 678 leaves) :

$$
\begin{aligned}
&-\frac{1}{16\,a^3\,(-a+b)\,(a+b)\,d}\Bigg(\frac{2\left(4\,a^3\,A\,b-20\,a\,A\,b^3+16\,a^2\,b^2\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\Big[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\Big]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\\
&\quad\frac{2\left(8\,a^4\,A+29\,a^2\,A\,b^2-45\,A\,b^4-28\,a^3\,b\,B+36\,a\,b^3\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\Big[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\Big]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\\
&\quad\Bigg(2\,\mathrm{i}\left(7\,a^2\,A\,b^2-15\,A\,b^4-4\,a^3\,b\,B+12\,a\,b^3\,B\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\\
&\quad\quad\Bigg(2\,a\,(a-b)\,\text{EllipticE}\Big[\mathrm{i}\,\text{ArcSinh}\Big[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big],\,\frac{a+b}{a-b}\Big]+b\,\Bigg(2\,a\,\text{EllipticF}\Big[\mathrm{i}\,\text{ArcSinh}\Big[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big],\\
&\quad\quad\quad\frac{a+b}{a-b}\Big]-b\,\text{EllipticPi}\Big[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\Big[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big],\,\frac{a+b}{a-b}\Big]\Bigg)\Bigg)\,\text{Sin}[c+d\,x]\Bigg)\Bigg/\\
&\quad\Bigg(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\;\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\\
&\quad\quad\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\Bigg)\Bigg)+\frac{1}{d}\\
&\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\Bigg(\frac{\text{Sec}[c+d\,x]\,(-7\,A\,b\,\text{Sin}[c+d\,x]+4\,a\,B\,\text{Sin}[c+d\,x])}{4\,a^3}-\frac{2\left(-A\,b^4\,\text{Sin}[c+d\,x]+a\,b^3\,B\,\text{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])}+\\
&\quad\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^2}\Bigg)
\end{aligned}
$$

- **Problem 338: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 349 leaves, 10 steps):

$$-\frac{2\left(7 a^2 A b-3 A b^3-4 a^3 B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a^2\left(a^2-b^2\right)^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{2(A b-a B) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a\left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{2 A \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2 b(A b-a B) \operatorname{Sin}[c+d x]}{3 a\left(a^2-b^2\right) d(a+b \operatorname{Cos}[c+d x])^{3/2}}+\frac{2 b\left(7 a^2 A b-3 A b^3-4 a^3 B\right) \operatorname{Sin}[c+d x]}{3 a^2\left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

Result (type 4, 743 leaves) :

$$\frac{1}{6\,a^2\,(a-b)^2\,(a+b)^2\,d\,(A+B\,\text{Cos}[c+d\,x])}$$

$$\text{Cos}[c+d\,x]\,(B+A\,\text{Sec}[c+d\,x])\left(\frac{2\left(-12\,a^3\,A\,b+4\,a\,A\,b^3+6\,a^4\,B+2\,a^2\,b^2\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(6\,a^4\,A-19\,a^2\,A\,b^2+9\,A\,b^4+4\,a^3\,b\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-7\,a^2\,A\,b^2+3\,A\,b^4+4\,a^3\,b\,B\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\ \text{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\right.\right.$$

$$\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d\,(A+B\,\text{Cos}[c+d\,x])}\text{Cos}[c+d\,x]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,(B+A\,\text{Sec}[c+d\,x])$$

$$\left(-\frac{2\left(-A\,b^2\,\text{Sin}[c+d\,x]+a\,b\,B\,\text{Sin}[c+d\,x]\right)}{3\,a\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\right.$$

$$\left.\frac{2\left(-7\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]+3\,A\,b^4\,\text{Sin}[c+d\,x]+4\,a^3\,b\,B\,\text{Sin}[c+d\,x]\right)}{3\,a^2\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}\right)$$

- **Problem 339: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 437 leaves, 11 steps):

$$-\frac{\left(3 a^4 A-26 a^2 A b^2+15 A b^4+14 a^3 b B-6 a b^3 B\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(3 a^2 A-5 A b^2+2 a b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a^2 \left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{(5 A b-2 a B) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{a^3 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{b \left(3 a^2 A-5 A b^2+2 a b B\right) \operatorname{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right) d (a+b \operatorname{Cos}[c+d x])^{3/2}}+\frac{b \left(3 a^4 A-26 a^2 A b^2+15 A b^4+14 a^3 b B-6 a b^3 B\right) \operatorname{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{A \operatorname{Tan}[c+d x]}{a d (a+b \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 4, 750 leaves):

$$\frac{1}{12\,a^3\,(-a+b)^2\,(a+b)^2\,d}\left(\frac{2\,\left(36\,a^3\,A\,b^2-20\,a\,A\,b^4-24\,a^4\,b\,B+8\,a^2\,b^3\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right.$$

$$2\,\left(-33\,a^4\,A\,b+86\,a^2\,A\,b^3-45\,A\,b^5+12\,a^5\,B-38\,a^3\,b^2\,B+18\,a\,b^4\,B\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\,\left(-3\,a^4\,A\,b+26\,a^2\,A\,b^3-15\,A\,b^5-14\,a^3\,b^2\,B+6\,a\,b^4\,B\right)\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2\,\left(-A\,b^3\,\mathrm{Sin}[c+d\,x]+a\,b^2\,B\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^2\,\left(a^2-b^2\right)\,(a+b\,\mathrm{Cos}[c+d\,x])^2}+\right.$$

$$\left.\frac{2\,\left(-10\,a^2\,A\,b^3\,\mathrm{Sin}[c+d\,x]+6\,A\,b^5\,\mathrm{Sin}[c+d\,x]+7\,a^3\,b^2\,B\,\mathrm{Sin}[c+d\,x]-3\,a\,b^4\,B\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^3\,\left(a^2-b^2\right)^2\,(a+b\,\mathrm{Cos}[c+d\,x])}+\frac{A\,\mathrm{Tan}[c+d\,x]}{a^3}\right)$$

- **Problem 340: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^3}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 532 leaves, 12 steps):

$$\left(\left(33 a^4 A b - 170 a^2 A b^3 + 105 A b^5 - 12 a^5 B + 104 a^3 b^2 B - 60 a b^4 B\right) \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), \frac{2 b}{a + b}\right]\right) \Big/$$

$$\left(12 a^4 \left(a^2 - b^2\right)^2 d \sqrt{\frac{a + b \operatorname{Cos}[c + d x]}{a + b}}\right) - \frac{\left(27 a^2 A b - 35 A b^3 - 12 a^3 B + 20 a b^2 B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{12 a^3 \left(a^2 - b^2\right) d \sqrt{a + b \operatorname{Cos}[c + d x]}} +$$

$$\frac{\left(4 a^2 A + 35 A b^2 - 20 a b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{4 a^4 d \sqrt{a + b \operatorname{Cos}[c + d x]}} - \frac{b \left(27 a^2 A b - 35 A b^3 - 12 a^3 B + 20 a b^2 B\right) \operatorname{Sin}[c + d x]}{12 a^3 \left(a^2 - b^2\right) d (a + b \operatorname{Cos}[c + d x])^{3/2}} -$$

$$\frac{b \left(33 a^4 A b - 170 a^2 A b^3 + 105 A b^5 - 12 a^5 B + 104 a^3 b^2 B - 60 a b^4 B\right) \operatorname{Sin}[c + d x]}{12 a^4 \left(a^2 - b^2\right)^2 d \sqrt{a + b \operatorname{Cos}[c + d x]}} - \frac{(7 A b - 4 a B) \operatorname{Tan}[c + d x]}{4 a^2 d (a + b \operatorname{Cos}[c + d x])^{3/2}} + \frac{A \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 a d (a + b \operatorname{Cos}[c + d x])^{3/2}}$$

Result (type 4, 820 leaves) :

$$\frac{1}{48\,a^4\,(a-b)^2\,(a+b)^2\,d}\left(\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right.$$

$$2\left(12\,a^5\,A\,b-216\,a^3\,A\,b^3+140\,a\,A\,b^5+144\,a^4\,b^2\,B-80\,a^2\,b^4\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]+\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

$$2\left(24\,a^6\,A+195\,a^4\,A\,b^2-566\,a^2\,A\,b^4+315\,A\,b^6-132\,a^5\,b\,B+344\,a^3\,b^3\,B-180\,a\,b^5\,B\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,\mathrm{i}\,\left(33\,a^4\,A\,b^2-170\,a^2\,A\,b^4+105\,A\,b^6-12\,a^5\,b\,B+104\,a^3\,b^3\,B-60\,a\,b^5\,B\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{\mathrm{Sec}[c+d\,x]\,(-11\,A\,b\,\mathrm{Sin}[c+d\,x]+4\,a\,B\,\mathrm{Sin}[c+d\,x])}{4\,a^4}-\frac{2\left(-A\,b^4\,\mathrm{Sin}[c+d\,x]+a\,b^3\,B\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])^2}-\right.$$

$$\left.\frac{2\left(-13\,a^2\,A\,b^4\,\mathrm{Sin}[c+d\,x]+9\,A\,b^6\,\mathrm{Sin}[c+d\,x]+10\,a^3\,b^3\,B\,\mathrm{Sin}[c+d\,x]-6\,a\,b^5\,B\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^4\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])}+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a^3}\right)$$

- **Problem 344: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a\,B+b\,B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 179 leaves, 8 steps):

$$-\frac{2\,b\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\left(a^2-b^2\right)d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{2\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,b^2\,B\,\mathrm{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 522 leaves) :

$$B\left(\frac{2\,b^2\,\mathrm{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{1}{2\,a\,(-a+b)\,(a+b)\,d}\right.$$

$$\left(-\frac{4\,a\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(2\,a^2-3\,b^2\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\left(2\,\mathrm{i}\,b^2\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\mathrm{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+\right.\right.$$

$$b\,\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)\right)$$

## Problem 369: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{3/2}\,(a+b\,\mathrm{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 86 leaves, 5 steps) :

$$-\frac{2\,A\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}-\frac{2\,(A\,b-a\,B)\,\mathrm{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,(a+b)\,d}+\frac{2\,A\,\mathrm{Sin}[c+d\,x]}{a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 210 leaves) :

$$\frac{1}{2\,a\,d}\left(\frac{2\,(-3\,A\,b+2\,a\,B)\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a+b}-\frac{2\,a\,A\left(2\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]-\frac{2\,a\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a+b}\right)}{b}+\right.$$

$$\frac{4\,A\,\text{Sin}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}}-1\Big/\left(a\,b\,\sqrt{\text{Sin}[c+d\,x]^2}\right)2\,A\left(-2\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+\right.$$

$$\left.\left.2\,a\,(a+b)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+\left(2\,a^2-b^2\right)\text{EllipticPi}\left[-\frac{b}{a},-\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]\right)\text{Sin}[c+d\,x]\right)$$

- **Problem 393: Result more than twice size of optimal antiderivative.**

$$\int\frac{a\,B+b\,B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 80 leaves, 6 steps) :

$$-\frac{2\,B\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}-\frac{2\,b\,B\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a\,(a+b)\,d}+\frac{2\,B\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 200 leaves) :

$$-\frac{1}{2\,a\,d}B\left(\frac{6\,b\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a+b}+\frac{2\,a\left(2\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]-\frac{2\,a\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a+b}\right)}{b}-\right.$$

$$\frac{4\,\text{Sin}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}}+1\Big/\left(a\,b\,\sqrt{\text{Sin}[c+d\,x]^2}\right)2\left(-2\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+\right.$$

$$\left.\left.2\,a\,(a+b)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]+\left(2\,a^2-b^2\right)\text{EllipticPi}\left[-\frac{b}{a},-\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],-1\right]\right)\text{Sin}[c+d\,x]\right)$$

- **Problem 395: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 560 leaves, 8 steps) :

$$-\frac{1}{24\,a\,b^2\,d}(a-b)\sqrt{a+b}\,\left(6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b^2\,d}\sqrt{a+b}\,(a+2\,b)\,(6\,A\,b-3\,a\,B+8\,b\,B)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{8\,b^3\,d}$$
$$\sqrt{a+b}\,\left(2\,a^2\,A\,b-8\,A\,b^3-a^3\,B-4\,a\,b^2\,B\right)\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{(2\,A\,b-a\,B)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}+\frac{B\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1224 leaves):

$$-\frac{1}{48\,b\,d}\left(-\left(4\,a\,\left(-18\,a\,A\,b+a^2\,B-16\,b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-24\,A\,b^2-28\,a\,b\,B\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-6\,a\,A\,b+3\,a^2\,B-16\,b^2\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\middle/\right.$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{(6\,A\,b+a\,B)\,\mathrm{Sin}[c+d\,x]}{12\,b}+\frac{1}{6}\,B\,\mathrm{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 396: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,(A+B\,\mathrm{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 473 leaves, 7 steps):

$$-\frac{1}{4\,a\,b\,d}$$

$$(a-b)\sqrt{a+b}\,(4\,A\,b+a\,B)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,b\,d}\sqrt{a+b}\,(4\,A\,b+(a+2\,b)\,B)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{4\,b^2\,d}\sqrt{a+b}\,\left(4\,a\,A\,b-a^2\,B+4\,b^2\,B\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{(4\,A\,b+a\,B)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,b\,d\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{B\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1175 leaves):

$$\frac{B\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d}+\frac{1}{8\,d}$$

$$\left(-\left(4\,a\,(4\,A\,b+3\,a\,B)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a$$

$$(8\,a\,A+4\,b\,B)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,(4\,A\,b+a\,B)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)$$

- **Problem 397: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} (A+B \operatorname{Cos}[c+d x])}{\sqrt{\operatorname{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 385 leaves, 6 steps) :

$$-\frac{1}{a\,d}(a-b)\sqrt{a+b}\;B\,\text{Cot}[c+d\,x]\;\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],\;-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{d}$$

$$\sqrt{a+b}\;(2\,A+B)\;\text{Cot}[c+d\,x]\;\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],\;-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b\,d}$$

$$\sqrt{a+b}\;(2\,A\,b+a\,B)\;\text{Cot}[c+d\,x]\;\text{EllipticPi}\Big[\frac{a+b}{b},\;\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],\;-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{B\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 3054 leaves) :

$$\Bigg((1+\text{Cos}[c+d\,x])^{3/2}\left(\frac{A\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}+B\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2$$

$$\Bigg(2\,(a+b)\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]-4\,(A\,b+a\,(-A+B))\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]-8\,A\,b\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,\;-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]-$$

$$4\,a\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,\;-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]+b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]\;\text{Sin}\Big[\frac{3}{2}(c+d\,x)\Big]+2\,a\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Bigg)\Bigg)\Bigg/$$

$$\Bigg(4\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\Bigg(\frac{1}{8\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,b\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Sin}[c+d\,x]$$

$$\Bigg(2\,(a+b)\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]-$$

$$4\,(A\,b+a\,(-A+B))\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$8\,A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-4\,a\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+b\,B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\mathrm{Sin}\Big[\frac{3}{2}\,(c+d\,x)\Big]+$$

$$2\,a\,B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-b\,B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg)-\frac{1}{8\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

$$3\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\mathrm{Sin}[c+d\,x]\,\Bigg(2\,(a+b)\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$4\,(A\,b+a\,(-A+B))\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$8\,A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-4\,a\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+b\,B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\mathrm{Sin}\Big[\frac{3}{2}\,(c+d\,x)\Big]+$$

$$2\,a\,B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-b\,B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg)+\frac{1}{4\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,(1+\mathrm{Cos}[c+d\,x])^{3/2}$$

$$\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\Bigg(2\,(a+b)\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$4\,(A\,b+a\,(-A+B))\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$8\,A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$4\,a\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\,a\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)+$$

$$\frac{1}{4\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(\frac{3}{2}\,b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Cos}\left[\frac{3}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$a\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2-\frac{1}{2}\,b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}\,(a+b)\,B$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$2\,(A\,b+a\,(-A+B))\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-$$

$$\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}\,4\,A\,b\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$2\,a\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$\frac{b\,B\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]}{2\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}+\frac{a\,B\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}-$$

$$\frac{b\,B\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{2\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}+\frac{1}{2}\,b\,B\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$\frac{2\,(A\,b+a\,(-A+B))\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+\frac{4\,A\,b\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{2\,a\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{(a+b)\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\Bigg)\Bigg)\Bigg)$$

- **Problem 398: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 351 leaves, 5 steps) :

$$\frac{1}{a\,d}2\,A\,(a-b)\sqrt{a+b}\;\text{Cot}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{a\,d}$$

$$2\sqrt{a+b}\;(A\,b-a\,(A-B))\;\text{Cot}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{d}2\sqrt{a+b}\;B\,\text{Cot}[c+d\,x]\;\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 1161 leaves) :

$$-\left(4 a^2 B \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b)\, d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\frac{1}{d} 4 a (-a A+b B) \left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$\frac{2 A \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{d \sqrt{\operatorname{Cos}[c+d x]}}-\frac{1}{d} 2 A b \left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}\right.+$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)$$

- **Problem 399: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 284 leaves, 4 steps):

$$\frac{1}{3 a^2 d}2 (a-b) \sqrt{a+b} (A b+3 a B) \mathrm{Cot}[c+d x] \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b \mathrm{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\mathrm{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\mathrm{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\mathrm{Sec}[c+d x])}{a-b}} +$$

$$\frac{1}{3 a d}2 (a-b) \sqrt{a+b} (A-3 B) \mathrm{Cot}[c+d x] \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b \mathrm{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\mathrm{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\mathrm{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\mathrm{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 A \sqrt{a+b \mathrm{Cos}[c+d x]} \mathrm{Sin}[c+d x]}{3 d \mathrm{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1229 leaves) :

$$\frac{1}{3 a d}$$

$$\left(-\left(4 a \left(a^2 A-A b^2\right) \sqrt{\frac{(a+b) \mathrm{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \mathrm{Cos}[c+d x] \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \mathrm{Cos}[c+d x]) \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \mathrm{Csc}[c+d x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b \mathrm{Cos}[c+d x]) \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\mathrm{Cos}[c+d x]} \sqrt{a+b \mathrm{Cos}[c+d x]}\right) -$$

$$4 a \left(-a A b-3 a^2 B\right) \left(\left(\sqrt{\frac{(a+b) \mathrm{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \mathrm{Cos}[c+d x] \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \mathrm{Cos}[c+d x]) \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \mathrm{Csc}[c+\right.\right.$$

$$\left.d x] \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b \mathrm{Cos}[c+d x]) \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\mathrm{Cos}[c+d x]} \sqrt{a+b \mathrm{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b) \mathrm{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \mathrm{Cos}[c+d x] \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \mathrm{Cos}[c+d x]) \mathrm{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \mathrm{Csc}[c+d x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-A\,b^2-3\,a\,b\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left.\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\ \left(\frac{2\,\text{Sec}[c+d x]\,(A\,b\,\text{Sin}[c+d x]+3\,a\,B\,\text{Sin}[c+d x])}{3\,a}+\frac{2}{3}\,A\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]\right)}{d}$$

- **Problem 400: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ (A+B\,\text{Cos}[c+d x])}{\text{Cos}[c+d x]^{7/2}}\,dx$$

Optimal (type 4, 350 leaves, 5 steps):

$$\frac{1}{15\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,A-2\,A\,b^2+5\,a\,b\,B\right)\,\text{Cot}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{15\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,(9\,a\,A+2\,A\,b-5\,a\,B)\,\text{Cot}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{5\,d\,\text{Cos}[c+d x]^{5/2}}+\frac{2\,(A\,b+5\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{15\,a\,d\,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1315 leaves):

$$-\frac{1}{15\,a^2\,d}\left(-\left(\left(4\,a\,\left(2\,a^2\,A\,b-2\,A\,b^3-5\,a^3\,B+5\,a\,b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)-4\,a\,\left(9\,a^3\,A-2\,a\,A\,b^2+5\,a^2\,b\,B\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(9\,a^2\,A\,b-2\,A\,b^3+5\,a\,b^2\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\ \text{EllipticPi}\Big[-\frac{a}{b},\ \text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\ -\frac{2\,a}{-a+b}\Big]\ \text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{2\,\text{Sec}[c+d\,x]^2\,(A\,b\,\text{Sin}[c+d\,x]+5\,a\,B\,\text{Sin}[c+d\,x])}{15\,a}+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]\,\left(9\,a^2\,A\,\text{Sin}[c+d\,x]-2\,A\,b^2\,\text{Sin}[c+d\,x]+5\,a\,b\,B\,\text{Sin}[c+d\,x]\right)}{15\,a^2}+$$

$$\left.\frac{2}{5}\ A\ \text{Sec}[c+d\,x]^2\ \text{Tan}[c+d\,x]\right)$$

- **Problem 401: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ (A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 433 leaves, 6 steps) :

$$\frac{1}{105\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(19\,a^2\,A\,b+8\,A\,b^3+63\,a^3\,B-14\,a\,b^2\,B\right)\,\text{Cot}[c+d\,x]\ \text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\Big],\ -\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2+a^2\,(25\,A-63\,B)+2\,a\,b\,(3\,A-7\,B)\right)$$

$$\text{Cot}[c+d\,x]\ \text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\Big],\ -\frac{a+b}{a-b}\Big]\ \sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,(A\,b+7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{35\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,\left(25\,a^2\,A-4\,A\,b^2+7\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{105\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1408 leaves) :

$$\frac{1}{105\,a^3\,d}\left(-\left(4\,a\,\left(25\,a^4\,A-17\,a^2\,A\,b^2-8\,A\,b^4-14\,a^3\,b\,B+14\,a\,b^3\,B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-19\,a^3\,A\,b-8\,a\,A\,b^3-63\,a^4\,B+14\,a^2\,b^2\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-19\,a^2\,A\,b^2-8\,A\,b^4-63\,a^3\,b\,B+14\,a\,b^3\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{2\,\mathrm{Sec}[c+d\,x]^3\,(A\,b\,\mathrm{Sin}[c+d\,x]+7\,a\,B\,\mathrm{Sin}[c+d\,x])}{35\,a}+\right.$$

$$\frac{2\,\mathrm{Sec}[c+d\,x]^2\left(25\,a^2\,A\,\mathrm{Sin}[c+d\,x]-4\,A\,b^2\,\mathrm{Sin}[c+d\,x]+7\,a\,b\,B\,\mathrm{Sin}[c+d\,x]\right)}{105\,a^2}+$$

$$\frac{2\,\mathrm{Sec}[c+d\,x]\left(19\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]+8\,A\,b^3\,\mathrm{Sin}[c+d\,x]+63\,a^3\,B\,\mathrm{Sin}[c+d\,x]-14\,a\,b^2\,B\,\mathrm{Sin}[c+d\,x]\right)}{105\,a^3}+$$

$$\left.\frac{2}{7}A\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 402: Result unnecessarily involves imaginary or complex numbers.**

$$\int \mathrm{Cos}[c+d\,x]^{3/2}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 670 leaves, 9 steps):

$$-\frac{1}{192\,a\,b^2\,d}(a-b)\sqrt{a+b}\left(24\,a^2\,A\,b+128\,A\,b^3-9\,a^3\,B+156\,a\,b^2\,B\right)\mathrm{Cot}[c+d\,x]$$
$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{192\,b^2\,d}\sqrt{a+b}\left(9\,a^3\,B-6\,a^2\,b\,(4\,A+B)-8\,b^3\,(16\,A+9\,B)-4\,a\,b^2\,(28\,A+39\,B)\right)\mathrm{Cot}[c+d\,x]$$
$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{64\,b^3\,d}$$
$$\sqrt{a+b}\left(8\,a^3\,A\,b-96\,a\,A\,b^3-3\,a^4\,B-24\,a^2\,b^2\,B-48\,b^4\,B\right)\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{\left(24\,a^2\,A\,b+128\,A\,b^3-9\,a^3\,B+156\,a\,b^2\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{192\,b^2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{\left(8\,a\,A\,b-3\,a^2\,B+12\,b^2\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{32\,b\,d}+$$
$$\frac{(8\,A\,b-3\,a\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{24\,b\,d}+\frac{B\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1284 leaves) :

$$-\frac{1}{384\,b\,d}\left(-\left(4\,a\left(-136\,a^2\,A\,b-128\,A\,b^3+3\,a^3\,B-228\,a\,b^2\,B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(-416\,a\,A\,b^2-228\,a^2\,b\,B-144\,b^3\,B\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(-24\,a^2\,A\,b-128\,A\,b^3+9\,a^3\,B-156\,a\,b^2\,B)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\mathrm{Csc}[c+d\,x]\ \mathrm{EllipticPi}\left[-\frac{a}{b},\ \mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right) \Big/$$

$$\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg) + \frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\Bigg)\Bigg) +$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \left(\frac{\left(56\,a\,A\,b+3\,a^2\,B+42\,b^2\,B\right)\mathrm{Sin}[c+d\,x]}{96\,b}+\right.$$

$$\left.\frac{1}{48}(8\,A\,b+9\,a\,B)\ \mathrm{Sin}[2\,(c+d\,x)]+\frac{1}{16}\,b\,B\,\mathrm{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 403: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\ (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\ (A+B\,\mathrm{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 566 leaves, 8 steps) :

$$-\frac{1}{24\,a\,b\,d}(a-b)\sqrt{a+b}\,\left(30\,a\,A\,b+3\,a^2\,B+16\,b^2\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b\,d}\sqrt{a+b}\,\left(30\,a\,A\,b+12\,A\,b^2+3\,a^2\,B+14\,a\,b\,B+16\,b^2\,B\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^2\,d}$$
$$\sqrt{a+b}\,\left(6\,a^2\,A\,b+8\,A\,b^3-a^3\,B+12\,a\,b^2\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(30\,a\,A\,b+3\,a^2\,B+16\,b^2\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{(6\,A\,b+7\,a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,d}+\frac{b\,B\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1227 leaves) :

$$\frac{1}{48\,d}\left(-\left(4\,a\,\left(42\,a\,A\,b+17\,a^2\,B+16\,b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(48\,a^2\,A+24\,A\,b^2+52\,a\,b\,B\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(30\,a\,A\,b+3\,a^2\,B+16\,b^2\,B\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Bigg/ \left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{12}(6\,A\,b+7\,a\,B)\,\text{Sin}[c+d\,x]+\frac{1}{6}\,b\,B\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 404: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 472 leaves, 7 steps) :

$$-\frac{1}{4\,a\,d}$$

$$(a-b)\sqrt{a+b}\,(4\,A\,b+5\,a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{1}{4\,d}\sqrt{a+b}\,(8\,a\,A+4\,A\,b+5\,a\,B+2\,b\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{4\,b\,d}\sqrt{a+b}\,\left(12\,a\,A\,b+3\,a^2\,B+4\,b^2\,B\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{(4\,A\,b+5\,a\,B)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\sqrt{\text{Cos}[c+d\,x]}} + \frac{b\,B\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1198 leaves) :

$$\frac{b\,B\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d} +$$

$$\frac{1}{8\,d}\left(-\left(4\,a\,\left(8\,a^2\,A+4\,A\,b^2+7\,a\,b\,B\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(16\,a\,A\,b+8\,a^2\,B+4\,b^2\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(4\,A\,b^2+5\,a\,b\,B\right)\,\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \text{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)$$

- **Problem 405: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b \operatorname{Cos}[c+d x])^{3/2} (A+B \operatorname{Cos}[c+d x])}{\operatorname{Cos}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 449 leaves, 7 steps) :

$$\frac{1}{a\,d}(a-b)\sqrt{a+b}\,(2aA-bB)\,\mathrm{Cot}[c+dx]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}-\frac{1}{d}$$

$$\sqrt{a+b}\,(2a\,(A-B)-b\,(4A+B))\,\mathrm{Cot}[c+dx]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}-$$

$$\frac{1}{d}\sqrt{a+b}\,(2Ab+3aB)\,\mathrm{Cot}[c+dx]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+dx])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+dx])}{a-b}}+$$

$$\frac{2aA\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{d\sqrt{\mathrm{Cos}[c+dx]}}-\frac{(2aA-bB)\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{d\sqrt{\mathrm{Cos}[c+dx]}}$$

Result (type 4, 1196 leaves):

$$\frac{2aA\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{d\sqrt{\mathrm{Cos}[c+dx]}}+$$

$$\frac{1}{2d}\left(\left(4a\left(-2aAb-2a^2B-b^2B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)+4a\left(2a^2A-2Ab^2-4abB\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\left(2\,a\,A\,b-b^2\,B\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) + \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 406: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 419 leaves, 6 steps):

$$\frac{1}{3\,a\,d}2\,(a-b)\,\sqrt{a+b}\,\,(4\,A\,b+3\,a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,d}2\,\sqrt{a+b}\,\left(3\,A\,b^2+a^2\,(A-3\,B)-a\,(4\,A\,b-6\,b\,B)\right)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$
$$2\,b\,\sqrt{a+b}\,\,B\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,a\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1236 leaves):

$$\frac{1}{3\,d}\Bigg(-\Bigg(4\,a\,\left(a^2\,A-A\,b^2+3\,a\,b\,B\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$
$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\,-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/$$
$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-4\,a\,A\,b-3\,a^2\,B+3\,b^2\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-4\,A\,b^2-3\,a\,b\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2}{3}\,\mathrm{Sec}[c+d\,x]\,(4\,A\,b\,\mathrm{Sin}[c+d\,x]+3\,a\,B\,\mathrm{Sin}[c+d\,x])+\frac{2}{3}\,a\,A\,\mathrm{Sec}[c+d\,x]\right.$$

$$\left.\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 407: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 353 leaves, 5 steps):

$$\frac{1}{15\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,A+3\,A\,b^2+20\,a\,b\,B\right)\,\mathrm{Cot}[c+d\,x]$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,(9\,a\,A-3\,A\,b-5\,a\,B+15\,b\,B)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{2\,(6\,A\,b+5\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{15\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1314 leaves):

$$-\frac{1}{15\,a\,d}\left(-\left(4\,a\,\left(-3\,a^2\,A\,b+3\,A\,b^3-5\,a^3\,B+5\,a\,b^2\,B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(9\,a^3\,A+3\,a\,A\,b^2+20\,a^2\,b\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(9\,a^2\,A\,b+3\,A\,b^3+20\,a\,b^2\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x] \text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)\right) + \frac{\sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{b \sqrt{\text{Cos}[c+d x]}}\right)\right) +$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]} \left(\frac{2}{15} \text{Sec}[c+d x]^2 (6 A b \text{Sin}[c+d x] + 5 a B \text{Sin}[c+d x]) +\right.$$

$$\frac{2 \text{Sec}[c+d x] \left(9 a^2 A \text{Sin}[c+d x] + 3 A b^2 \text{Sin}[c+d x] + 20 a b B \text{Sin}[c+d x]\right)}{15 a} +$$

$$\left.\frac{2}{5} a A \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\right)$$

- **Problem 408: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 433 leaves, 6 steps) :

$$\frac{1}{105\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(82\,a^2\,A\,b-6\,A\,b^3+63\,a^3\,B+21\,a\,b^2\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{105\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(6\,A\,b^2-a^2\,(25\,A-63\,B)+3\,a\,b\,(19\,A-7\,B)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,(8\,A\,b+7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,\left(25\,a^2\,A+3\,A\,b^2+42\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1407 leaves) :

$$\frac{1}{105\,a^2\,d}\left(-\left(\left(4\,a\,\left(25\,a^4\,A-31\,a^2\,A\,b^2+6\,A\,b^4+21\,a^3\,b\,B-21\,a\,b^3\,B\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-4\,a\,\left(-82\,a^3\,A\,b+6\,a\,A\,b^3-63\,a^4\,B-21\,a^2\,b^2\,B\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(-82\,a^2\,A\,b^2+6\,A\,b^4-63\,a^3\,b\,B-21\,a\,b^3\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\operatorname{Csc}[c+d\,x]\ \operatorname{EllipticPi}\left[-\frac{a}{b},\ \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\operatorname{Cos}[c+d\,x]}\ \sqrt{a+b\operatorname{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}\ \operatorname{Sin}[c+d\,x]}{b\sqrt{\operatorname{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\operatorname{Cos}[c+d\,x]}\ \sqrt{a+b\operatorname{Cos}[c+d\,x]}\ \Bigg(\frac{2}{35}\operatorname{Sec}[c+d\,x]^3\,(8\,A\,b\operatorname{Sin}[c+d\,x]+7\,a\,B\operatorname{Sin}[c+d\,x])+$$

$$\frac{2\operatorname{Sec}[c+d\,x]^2\left(25\,a^2\,A\operatorname{Sin}[c+d\,x]+3\,A\,b^2\operatorname{Sin}[c+d\,x]+42\,a\,b\,B\operatorname{Sin}[c+d\,x]\right)}{105\,a}+$$

$$\frac{2\operatorname{Sec}[c+d\,x]\left(82\,a^2\,A\,b\operatorname{Sin}[c+d\,x]-6\,A\,b^3\operatorname{Sin}[c+d\,x]+63\,a^3\,B\operatorname{Sin}[c+d\,x]+21\,a\,b^2\,B\operatorname{Sin}[c+d\,x]\right)}{105\,a^2}+$$

$$\frac{2}{7}\,a\,A\operatorname{Sec}[c+d\,x]^3\operatorname{Tan}[c+d\,x]\Bigg)$$

- **Problem 409: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\operatorname{Cos}[c+d\,x])^{3/2}\,(A+B\operatorname{Cos}[c+d\,x])}{\operatorname{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 522 leaves, 7 steps):

$$\frac{1}{315\,a^4\,d}2\,(a-b)\sqrt{a+b}\,\left(147\,a^4\,A+33\,a^2\,A\,b^2+8\,A\,b^4+246\,a^3\,b\,B-18\,a\,b^3\,B\right)\operatorname{Cot}[c+d\,x]$$

$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\operatorname{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+\frac{1}{315\,a^3\,d}$$

$$2\,(a-b)\sqrt{a+b}\,\left(8\,A\,b^3-a^3\,(147\,A-75\,B)+3\,a^2\,b\,(13\,A-57\,B)+6\,a\,b^2\,(A-3\,B)\right)\operatorname{Cot}[c+d\,x]\ \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\operatorname{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,A\sqrt{a+b\operatorname{Cos}[c+d\,x]}\ \operatorname{Sin}[c+d\,x]}{9\,d\operatorname{Cos}[c+d\,x]^{9/2}}+\frac{2\,(10\,A\,b+9\,a\,B)\sqrt{a+b\operatorname{Cos}[c+d\,x]}\ \operatorname{Sin}[c+d\,x]}{63\,d\operatorname{Cos}[c+d\,x]^{7/2}}+$$

$$\frac{2\left(49\,a^2\,A+3\,A\,b^2+72\,a\,b\,B\right)\sqrt{a+b\operatorname{Cos}[c+d\,x]}\ \operatorname{Sin}[c+d\,x]}{315\,a\,d\operatorname{Cos}[c+d\,x]^{5/2}}+\frac{2\left(88\,a^2\,A\,b-4\,A\,b^3+75\,a^3\,B+9\,a\,b^2\,B\right)\sqrt{a+b\operatorname{Cos}[c+d\,x]}\ \operatorname{Sin}[c+d\,x]}{315\,a^2\,d\operatorname{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1515 leaves) :

$$-\frac{1}{315 a^3 d}\left(-\left(4 a \left(-39 a^4 A b+31 a^2 A b^3+8 A b^5-75 a^5 B+93 a^3 b^2 B-18 a b^4 B\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(147 a^5 A+33 a^3 A b^2+8 a A b^4+246 a^4 b B-18 a^2 b^3 B\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x] \text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(147\,a^4\,A\,b+33\,a^2\,A\,b^3+8\,A\,b^5+246\,a^3\,b^2\,B-18\,a\,b^4\,B\right)$$

$$\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{63}\,\text{Sec}[c+d\,x]^4\,(10\,A\,b\,\text{Sin}[c+d\,x]+9\,a\,B\,\text{Sin}[c+d\,x])+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]^3\left(49\,a^2\,A\,\text{Sin}[c+d\,x]+3\,A\,b^2\,\text{Sin}[c+d\,x]+72\,a\,b\,B\,\text{Sin}[c+d\,x]\right)}{315\,a}+$$

$$\frac{1}{315\,a^2}$$
$$2\,\text{Sec}[c+d\,x]^2\left(88\,a^2\,A\,b\,\text{Sin}[c+d\,x]-4\,A\,b^3\,\text{Sin}[c+d\,x]+75\,a^3\,B\,\text{Sin}[c+d\,x]+9\,a\,b^2\,B\,\text{Sin}[c+d\,x]\right)+$$

$$\frac{1}{315\,a^3}$$
$$2\,\text{Sec}[c+d\,x]\left(147\,a^4\,A\,\text{Sin}[c+d\,x]+33\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]+8\,A\,b^4\,\text{Sin}[c+d\,x]+246\,a^3\,b\,B\,\text{Sin}[c+d\,x]-18\,a\,b^3\,B\,\text{Sin}[c+d\,x]\right)+$$

$$\left.\frac{2}{9}\,a\,A\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 410: Result unnecessarily involves imaginary or complex numbers.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 779 leaves, 10 steps) :

$$-\frac{1}{1920\,a\,b^2\,d}(a-b)\sqrt{a+b}\,\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{1920\,b^2\,d}\sqrt{a+b}\,\left(45\,a^4\,B-30\,a^3\,b\,(5\,A+B)-16\,b^4\,(45\,A+64\,B)-8\,a\,b^3\,(355\,A+193\,B)-4\,a^2\,b^2\,(295\,A+423\,B)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{128\,b^3\,d}\sqrt{a+b}\,\left(10\,a^4\,A\,b-240\,a^2\,A\,b^3-96\,A\,b^5-3\,a^5\,B-40\,a^3\,b^2\,B-240\,a\,b^4\,B\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{1920\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(50\,a^2\,A\,b+120\,A\,b^3-15\,a^3\,B+172\,a\,b^2\,B\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{320\,b\,d}+$$

$$\frac{\left(50\,a\,A\,b-15\,a^2\,B+64\,b^2\,B\right)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{240\,b\,d}+$$

$$\frac{(10\,A\,b-3\,a\,B)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{40\,b\,d}+\frac{B\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{7/2}\,\text{Sin}[c+d\,x]}{5\,b\,d}$$

Result (type 4, 1353 leaves) :

$$-\frac{1}{3840\,b\,d}$$

$$\left(\left(-4\,a\,\left(-1330\,a^3\,A\,b-3560\,a\,A\,b^3+15\,a^4\,B-3236\,a^2\,b^2\,B-1024\,b^4\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-6440\,a^2\,A\,b^2-1440\,A\,b^4-2292\,a^3\,b\,B-4624\,a\,b^3\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-150\,a^3\,A\,b-2840\,a\,A\,b^3+45\,a^4\,B-1692\,a^2\,b^2\,B-1024\,b^4\,B\right)$$

$$\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{\left(590\,a^2\,A\,b+420\,A\,b^3+15\,a^3\,B+898\,a\,b^2\,B\right)\text{Sin}[c+d\,x]}{960\,b}+\right.$$

$$\frac{1}{480}\left(170\,a\,A\,b+93\,a^2\,B+88\,b^2\,B\right)\text{Sin}[2\,(c+d\,x)]+$$

$$\left.\frac{1}{160}\,b\,(10\,A\,b+21\,a\,B)\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{40}\,b^2\,B\,\text{Sin}[4\,(c+d\,x)]\right)$$

## Problem 411: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,dx$$

Optimal (type 4, 664 leaves, 9 steps) :

$$-\frac{1}{192\,a\,b\,d}(a-b)\sqrt{a+b}\,\left(264\,a^2\,A\,b+128\,A\,b^3+15\,a^3\,B+284\,a\,b^2\,B\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{192\,b\,d}\sqrt{a+b}\,\left(15\,a^3\,B+8\,b^3\,(16\,A+9\,B)+2\,a^2\,b\,(132\,A+59\,B)+4\,a\,b^2\,(52\,A+71\,B)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{64\,b^2\,d}$$

$$\sqrt{a+b}\,\left(40\,a^3\,A\,b+160\,a\,A\,b^3-5\,a^4\,B+120\,a^2\,b^2\,B+48\,b^4\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{\left(264\,a^2\,A\,b+128\,A\,b^3+15\,a^3\,B+284\,a\,b^2\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}\,+$$

$$\frac{\left(24\,a\,A\,b+5\,a^2\,B+12\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,d}\,+$$

$$\frac{(8\,A\,b+11\,a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{b\,B\,\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 4, 1287 leaves) :

$$\frac{1}{384\,d}\left(-\left(\left(4\,a\,\left(472\,a^2\,A\,b+128\,A\,b^3+133\,a^3\,B+356\,a\,b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left(\left(a+b\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-4\,a\,\left(384\,a^3\,A+608\,a\,A\,b^2+644\,a^2\,b\,B+144\,b^3\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(264\,a^2\,A\,b+128\,A\,b^3+15\,a^3\,B+284\,a\,b^2\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\left.\operatorname{Csc}[c+d\,x]\,\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left(b\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\operatorname{Sin}[c+d\,x]}{b\sqrt{\operatorname{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\left(\frac{1}{96}\left(104\,a\,A\,b+59\,a^2\,B+42\,b^2\,B\right)\operatorname{Sin}[c+d\,x]+\frac{1}{48}\,b\,(8\,A\,b+17\,a\,B)\operatorname{Sin}[2\,(c+d\,x)]+\frac{1}{16}\,b^2\,B\operatorname{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 412: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\operatorname{Cos}[c+d\,x])^{5/2}\,(A+B\operatorname{Cos}[c+d\,x])}{\sqrt{\operatorname{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 564 leaves, 8 steps):

$$-\frac{1}{24\,a\,d}(a-b)\sqrt{a+b}\,\left(54\,a\,A\,b+33\,a^2\,B+16\,b^2\,B\right)\operatorname{Cot}[c+d\,x]\,\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,d}\sqrt{a+b}\,\left(4\,b^2\,(3\,A+4\,B)+a^2\,(48\,A+33\,B)+a\,(54\,A\,b+26\,b\,B)\right)\operatorname{Cot}[c+d\,x]\,\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d}\sqrt{a+b}\,\left(30\,a^2\,A\,b+8\,A\,b^3+5\,a^3\,B+20\,a\,b^2\,B\right)\operatorname{Cot}[c+d\,x]\,\operatorname{EllipticPi}\left[\frac{a+b}{b},\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+\frac{\left(54\,a\,A\,b+33\,a^2\,B+16\,b^2\,B\right)\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\operatorname{Sin}[c+d\,x]}{24\,d\sqrt{\operatorname{Cos}[c+d\,x]}}+\frac{b\,(2\,A\,b+3\,a\,B)\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\operatorname{Sin}[c+d\,x]}{4\,d}+\frac{b\,B\sqrt{\operatorname{Cos}[c+d\,x]}\,(a+b\operatorname{Cos}[c+d\,x])^{3/2}\operatorname{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1251 leaves):

$$\frac{1}{48\,d}\left(-\left(4\,a\,\left(48\,a^3\,A+66\,a\,A\,b^2+59\,a^2\,b\,B+16\,b^3\,B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(144\,a^2\,A\,b+24\,A\,b^3+48\,a^3\,B+76\,a\,b^2\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(54\,a\,A\,b^2+33\,a^2\,b\,B+16\,b^3\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{1}{12}b\,(6\,A\,b+13\,a\,B)\,\text{Sin}[c+d\,x]+\frac{1}{6}b^2\,B\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 413: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 547 leaves, 8 steps) :

$$\frac{1}{4\,a\,d}(a-b)\sqrt{a+b}\,\left(8\,a^2\,A-4\,A\,b^2-9\,a\,b\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d}\sqrt{a+b}\,\left(8\,a^2\,(A-B)-2\,b^2\,(2\,A+B)-3\,a\,b\,(8\,A+3\,B)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{4\,d}\sqrt{a+b}\,\left(20\,a\,A\,b+15\,a^2\,B+4\,b^2\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{\left(8\,a^2\,A-4\,A\,b^2-9\,a\,b\,B\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{b\,(4\,a\,A-b\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{2\,a\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1241 leaves) :

$$\frac{1}{8\,d}\left(\left(4\,a\,\left(-16\,a^2\,A\,b-4\,A\,b^3-8\,a^3\,B-11\,a\,b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a\,\left(8\,a^3\,A-24\,a\,A\,b^2-24\,a^2\,b\,B-4\,b^3\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\,\left(8\,a^2\,A\,b-4\,A\,b^3-9\,a\,b^2\,B\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg) \Bigg/ \left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{2}\,b^2\,B\,\text{Sin}[c+d\,x]+2\,a^2\,A\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 414: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 536 leaves, 8 steps):

$$\frac{1}{3\,a\,d}(a-b)\,\sqrt{a+b}\,\left(14\,a\,A\,b+6\,a^2\,B-3\,b^2\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{3\,d}\sqrt{a+b}\,\left(2\,a\,b\,(7\,A-9\,B)-2\,a^2\,(A-3\,B)-3\,b^2\,(6\,A+B)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{d}$$

$$b\,\sqrt{a+b}\,\left(2\,A\,b+5\,a\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{2\,a\,(2\,A\,b+a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}} -$$

$$\frac{\left(14\,a\,A\,b+6\,a^2\,B-3\,b^2\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}} + \frac{2\,a\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1269 leaves):

$$\frac{1}{6\,d}\left(-\left(4\,a\,\left(2\,a^3\,A+4\,a\,A\,b^2+12\,a^2\,b\,B+3\,b^3\,B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-14\,a^2\,A\,b+6\,A\,b^3-6\,a^3\,B+18\,a\,b^2\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-14\,a\,A\,b^2-6\,a^2\,b\,B+3\,b^3\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{3}\text{Sec}[c+d\,x]\left(7\,a\,A\,b\,\text{Sin}[c+d\,x]+3\,a^2\,B\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\left.\frac{2}{3}a^2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)$$

- **Problem 415: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 493 leaves, 7 steps):

$$\frac{1}{15\,a\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,A+23\,A\,b^2+35\,a\,b\,B\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{15\,a\,d}2\,\sqrt{a+b}\,\left(15\,A\,b^3-a\,b^2\,(23\,A-45\,B)+a^2\,b\,(17\,A-35\,B)-a^3\,(9\,A-5\,B)\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$
$$2\,b^2\,\sqrt{a+b}\,B\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,a\,(8\,A\,b+5\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}$$

Result (type 4, 1319 leaves):

$$\frac{1}{15\,d}\left(\left(4\,a\,\left(-8\,a^2\,A\,b+8\,A\,b^3-5\,a^3\,B-10\,a\,b^2\,B\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a\,\left(9\,a^3\,A+23\,a\,A\,b^2+35\,a^2\,b\,B-15\,b^3\,B\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\left(9\,a^2\,A\,b+23\,A\,b^3+35\,a\,b^2\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\,\left(\frac{2}{15}\,\text{Sec}[c+d x]^2\,\left(11\,a\,A\,b\,\text{Sin}[c+d x]+5\,a^2\,B\,\text{Sin}[c+d x]\right)+\frac{2}{15}\,\text{Sec}[c+d x]\,\left(9\,a^2\,A\,\text{Sin}[c+d x]+23\,A\,b^2\,\text{Sin}[c+d x]+35\,a\,b\,B\,\text{Sin}[c+d x]\right)+\frac{2}{5}\,a^2\,A\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)$$

## Problem 416: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{(a+b\,\text{Cos}[c+d x])^{5/2}\,(A+B\,\text{Cos}[c+d x])}{\text{Cos}[c+d x]^{9/2}}\,dx$$

Optimal (type 4, 434 leaves, 6 steps):

$$\frac{1}{105\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(145\,a^2\,A\,b+15\,A\,b^3+63\,a^3\,B+161\,a\,b^2\,B\right)\,\text{Cot}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{105\,a\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(a^2\,(25\,A-63\,B)+15\,b^2\,(A-7\,B)-8\,a\,b\,(15\,A-7\,B)\right)\,\text{Cot}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+\frac{2\,a\,(10\,A\,b+7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{35\,d\,\text{Cos}[c+d x]^{5/2}}+$$

$$\frac{2\,\left(25\,a^2\,A+45\,A\,b^2+77\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{105\,d\,\text{Cos}[c+d x]^{3/2}}+\frac{2\,a\,A\,(a+b\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{7\,d\,\text{Cos}[c+d x]^{7/2}}$$

Result (type 4, 1409 leaves):

$$\frac{1}{105\,a\,d}\Bigg(-\Bigg(4\,a\,\left(25\,a^4\,A-10\,a^2\,A\,b^2-15\,A\,b^4+56\,a^3\,b\,B-56\,a\,b^3\,B\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(-145\,a^3\,A\,b-15\,a\,A\,b^3-63\,a^4\,B-161\,a^2\,b^2\,B\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+2\left(-145\,a^2\,A\,b^2-15\,A\,b^4-63\,a^3\,b\,B-161\,a\,b^3\,B\right)$$

$$\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2\,a \left(\left(a \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}} \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right) \Big/ \left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}} \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right) \Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right) + \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right) +$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{2}{35}\text{Sec}[c+d\,x]^3 \left(15\,a\,A\,b\,\text{Sin}[c+d\,x] + 7\,a^2\,B\,\text{Sin}[c+d\,x]\right) + \right.$$
$$\frac{2}{105}\text{Sec}[c+d\,x]^2$$
$$\left(25\,a^2\,A\,\text{Sin}[c+d\,x] + 45\,A\,b^2\,\text{Sin}[c+d\,x] + 77\,a\,b\,B\,\text{Sin}[c+d\,x]\right) +$$
$$1/(105\,a)\,2\,\text{Sec}[c+d\,x]\left(145\,a^2\,A\,b\,\text{Sin}[c+d\,x] + 15\,A\,b^3\,\text{Sin}[c+d\,x] + 63\,a^3\,B\,\text{Sin}[c+d\,x] + 161\,a\,b^2\,B\,\text{Sin}[c+d\,x]\right) +$$
$$\left.\frac{2}{7}a^2\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 417: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 522 leaves, 7 steps) :

$$\frac{1}{315 a^3 d} 2 (a-b) \sqrt{a+b} \left(147 a^4 A + 279 a^2 A b^2 - 10 A b^4 + 435 a^3 b B + 45 a b^3 B\right) \text{Cot}[c+d x] \, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{315 a^2 d} 2 (a-b) \sqrt{a+b} \left(10 A b^3 - 6 a^2 b (19 A - 60 B) + 3 a^3 (49 A - 25 B) + 15 a b^2 (11 A - 3 B)\right) \text{Cot}[c+d x] \, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{2 a (4 A b + 3 a B) \sqrt{a+b \text{Cos}[c+d x]} \, \text{Sin}[c+d x]}{21 d \, \text{Cos}[c+d x]^{7/2}} + \frac{2 \left(49 a^2 A + 75 A b^2 + 135 a b B\right) \sqrt{a+b \text{Cos}[c+d x]} \, \text{Sin}[c+d x]}{315 d \, \text{Cos}[c+d x]^{5/2}} + \frac{2 \left(163 a^2 A b + 5 A b^3 + 75 a^3 B + 135 a b^2 B\right) \sqrt{a+b \text{Cos}[c+d x]} \, \text{Sin}[c+d x]}{315 a d \, \text{Cos}[c+d x]^{3/2}} + \frac{2 a A (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{9 d \, \text{Cos}[c+d x]^{9/2}}$$

Result (type 4, 1517 leaves) :

$$-\frac{1}{315 a^2 d} \left( \left( -\left( 4 a \left(-114 a^4 A b + 124 a^2 A b^3 - 10 A b^5 - 75 a^5 B + 30 a^3 b^2 B + 45 a b^4 B\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \, \text{Csc}[c+d x] \, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4 \right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) - 4 a \left(147 a^5 A + 279 a^3 A b^2 - 10 a A b^4 + 435 a^4 b B + 45 a^2 b^3 B\right) \left( \left( \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \, \text{Csc}[c+d x] \right.\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+2\,\left(147\,a^4\,A\,b+279\,a^2\,A\,b^3-10\,A\,b^5+435\,a^3\,b^2\,B+45\,a\,b^4\,B\right)$$

$$\Bigg(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{63}\text{Sec}[c+d\,x]^4\,(19\,a\,A\,b\,\text{Sin}[c+d\,x]+9\,a^2\,B\,\text{Sin}[c+d\,x])+\right.$$

$$\frac{2}{315}\text{Sec}[c+d\,x]^3\,(49\,a^2\,A\,\text{Sin}[c+d\,x]+75\,A\,b^2\,\text{Sin}[c+d\,x]+135\,a\,b\,B\,\text{Sin}[c+d\,x])+$$

$$\frac{1}{315\,a}2\,\text{Sec}[c+d\,x]^2\,(163\,a^2\,A\,b\,\text{Sin}[c+d\,x]+5\,A\,b^3\,\text{Sin}[c+d\,x]+75\,a^3\,B\,\text{Sin}[c+d\,x]+135\,a\,b^2\,B\,\text{Sin}[c+d\,x])+$$

$$\frac{1}{315\,a^2}2\,\text{Sec}[c+d\,x]\,(147\,a^4\,A\,\text{Sin}[c+d\,x]+279\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]-10\,A\,b^4\,\text{Sin}[c+d\,x]+435\,a^3\,b\,B\,\text{Sin}[c+d\,x]+45\,a\,b^3\,B\,\text{Sin}[c+d\,x])+$$

$$\left.\frac{2}{9}a^2\,A\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 418: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\text{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 4, 622 leaves, 8 steps):

$$\frac{1}{3465 a^4 d} 2 (a-b) \sqrt{a+b} \left(3705 a^4 A b + 255 a^2 A b^3 + 40 A b^5 + 1617 a^5 B + 3069 a^3 b^2 B - 110 a b^4 B\right)$$

$$\text{Cot}[c+d x] \,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{1}{3465 a^3 d} 2 (a-b) \sqrt{a+b} \left(40 A b^4 + 3 a^4 (225 A - 539 B) - 6 a^3 b (505 A - 209 B) + 15 a^2 b^2 (19 A - 121 B) + 10 a b^3 (3 A - 11 B)\right)$$

$$\text{Cot}[c+d x] \,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 a (14 A b + 11 a B) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{99 d \text{Cos}[c+d x]^{9/2}} + \frac{2 \left(81 a^2 A + 113 A b^2 + 209 a b B\right) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{693 d \text{Cos}[c+d x]^{7/2}} +$$

$$\frac{2 \left(1145 a^2 A b + 15 A b^3 + 539 a^3 B + 825 a b^2 B\right) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{3465 a d \text{Cos}[c+d x]^{5/2}} +$$

$$\frac{2 \left(675 a^4 A + 1025 a^2 A b^2 - 20 A b^4 + 1793 a^3 b B + 55 a b^3 B\right) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{3465 a^2 d \text{Cos}[c+d x]^{3/2}} + \frac{2 a A (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{11 d \text{Cos}[c+d x]^{11/2}}$$

Result (type 4, 1640 leaves):

$$\frac{1}{3465 a^3 d} \left(-\left(4 a \left(675 a^6 A - 390 a^4 A b^2 - 245 a^2 A b^4 - 40 A b^6 + 1254 a^5 b B - 1364 a^3 b^3 B + 110 a b^5 B\right)\right.\right.$$

$$\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$4 a \left(-3705 a^5 A b - 255 a^3 A b^3 - 40 a A b^5 - 1617 a^6 B - 3069 a^4 b^2 B + 110 a^2 b^4 B\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-3705\,a^4\,A\,b^2-255\,a^2\,A\,b^4-40\,A\,b^6-1617\,a^5\,b\,B-3069\,a^3\,b^3\,B+110\,a\,b^5\,B\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg) \Bigg/$$

$$\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\Bigg) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\Bigg)\Bigg) +$$

$$\frac{1}{d} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2}{99} \operatorname{Sec}[c+d x]^5 \left(23 a A b \operatorname{Sin}[c+d x]+11 a^2 B \operatorname{Sin}[c+d x]\right)+\right.$$

$$\frac{2}{693} \operatorname{Sec}[c+d x]^4 \left(81 a^2 A \operatorname{Sin}[c+d x]+113 A b^2 \operatorname{Sin}[c+d x]+209 a b B \operatorname{Sin}[c+d x]\right)+\frac{1}{3465 a}$$

$$2 \operatorname{Sec}[c+d x]^3 \left(1145 a^2 A b \operatorname{Sin}[c+d x]+15 A b^3 \operatorname{Sin}[c+d x]+539 a^3 B \operatorname{Sin}[c+d x]+825 a b^2 B \operatorname{Sin}[c+d x]\right)+\frac{1}{3465 a^2}$$

$$2 \operatorname{Sec}[c+d x]^2 \left(675 a^4 A \operatorname{Sin}[c+d x]+1025 a^2 A b^2 \operatorname{Sin}[c+d x]-20 A b^4 \operatorname{Sin}[c+d x]+1793 a^3 b B \operatorname{Sin}[c+d x]+55 a b^3 B \operatorname{Sin}[c+d x]\right)+$$

$$\frac{1}{3465 a^3} 2 \operatorname{Sec}[c+d x] \left(3705 a^4 A b \operatorname{Sin}[c+d x]+255 a^2 A b^3 \operatorname{Sin}[c+d x]+40 A b^5 \operatorname{Sin}[c+d x]+\right.$$

$$\left.\left.1617 a^5 B \operatorname{Sin}[c+d x]+3069 a^3 b^2 B \operatorname{Sin}[c+d x]-110 a b^4 B \operatorname{Sin}[c+d x]\right)+\frac{2}{11} a^2 A \operatorname{Sec}[c+d x]^5 \operatorname{Tan}[c+d x]\right)$$

- **Problem 419: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b \operatorname{Cos}[c+d x])^{5/2} \left(\frac{3 b B}{2 a}+B \operatorname{Cos}[c+d x]\right)}{\operatorname{Cos}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 418 leaves, 6 steps) :

$$\frac{1}{a\,d}2\,(a-b)\,\sqrt{a+b}\,\left(a^2+3\,b^2\right)\,B\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{a\,d}(a-3\,b)\,\sqrt{a+b}\,\left(2\,a^2-a\,b+3\,b^2\right)\,B\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{d}b\,\sqrt{a+b}\,\left(5\,a+\frac{3\,b^2}{a}\right)\,B\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{b\,B\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1236 leaves) :

$$-\frac{1}{2\,a\,d}$$

$$B\left(-\left(4\,a\,\left(-5\,a^3\,b-3\,a\,b^3\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[\right.\right.$$

$$\left.c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(2\,a^4+a^2\,b^2-3\,b^4\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(2\,a^3\,b+6\,a\,b^3\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\text{Sec}[c+d\,x]\ \left(2\,a^2\,B\,\text{Sin}[c+d\,x]+7\,b^2\,B\,\text{Sin}[c+d\,x]\right)+\right.$$

a
b
B
Sec[c + d x]
Tan[c + d x])

## ■ Problem 420: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 479 leaves, 7 steps):

$$-\frac{1}{4\,a\,b^2\,d}(a-b)\sqrt{a+b}\ (4\,A\,b-3\,a\,B)\ \text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^2\,d}$$

$$\sqrt{a+b}\ (4\,A\,b-3\,a\,B+2\,b\,B)\ \text{Cot}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,b^3\,d}\sqrt{a+b}\ \left(4\,a\,A\,b-3\,a^2\,B-4\,b^2\,B\right)\ \text{Cot}[c+d\,x]\ \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{(4\,A\,b-3\,a\,B)\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{4\,b^2\,d\sqrt{\text{Cos}[c+d\,x]}}+\frac{B\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{2\,b\,d}$$

Result (type 4, 1175 leaves):

$$\frac{B\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{2\,b\,d}+\frac{1}{8\,b\,d}$$

$$\left(-\left(4\,a\,(4\,A\,b-a\,B)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$16\,a\,b\,B\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,(4\,A\,b-3\,a\,B)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 421: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Cos}[c+d\,x]}\;(A+B\,\text{Cos}[c+d\,x])}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 427 leaves, 7 steps):

$$-\frac{1}{a\,b\,d}(a-b)\sqrt{a+b}\;B\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\;+$$

$$\frac{\sqrt{a+b}\;B\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{b\,d}-\frac{1}{b^2\,d}$$

$$\sqrt{a+b}\;(2\,A\,b-a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\;+$$

$$\frac{a\,B\,\text{Sin}[c+d\,x]}{b\,d\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{B\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 4017 leaves):

$$\Bigg((1+\text{Cos}[c+d\,x])^{3/2}\left(\frac{A\,\sqrt{\text{Cos}[c+d\,x]}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{B\,\text{Cos}[c+d\,x]^{3/2}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right)\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2$$

$$\Bigg(2\,i\,(a-b)\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\Big[i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]+$$

$$4\,i\,(A\,b-a\,B)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\Big[i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]-$$

$$8\,i\,A\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[\frac{a+b}{a-b},i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]+$$

$$4\,i\,a\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[\frac{a+b}{a-b},i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]+b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]\,\text{Sin}\Big[\frac{3}{2}(c+d\,x)\Big]+2\,a\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Bigg)\Bigg)\Big/$$

$$\left(4\,b\,\sqrt{\frac{a-b}{a+b}}\;d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{1}{8\,\sqrt{\frac{a-b}{a+b}}\;(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,(1+\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}\,\mathrm{Sin}[c+d\,x]\right.\right.$$

$$\left(2\,\mathrm{i}\,(a-b)\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+\right.$$

$$4\,\mathrm{i}\,(A\,b-a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-8\,\mathrm{i}\,A\,b$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+4\,\mathrm{i}\,a\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$\left.2\,a\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)-$$

$$\frac{1}{8\,b\,\sqrt{\frac{a-b}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,3\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}\,\mathrm{Sin}[c+d\,x]$$

$$\left(2\,\mathrm{i}\,(a-b)\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+\right.$$

$$4\,\mathrm{i}\,(A\,b-a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-8\,\mathrm{i}\,A\,b$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+4\,\mathrm{i}\,a\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$2\,a\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)+$$

$$\frac{1}{4\,b\,\sqrt{\frac{a-b}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\Bigg(2\,\mathbb{i}\,(a-b)\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]+$$

$$4\,\mathbb{i}\,(A\,b-a\,B)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]-8\,\mathbb{i}\,A\,b$$

$$\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathbb{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]+4\,\mathbb{i}\,a\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathbb{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]+b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$2\,a\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)+$$

$$\frac{1}{4\,b\,\sqrt{\frac{a-b}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\Bigg(\frac{3}{2}\,b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Cos}\left[\frac{3}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$a\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2-\frac{1}{2}\,b\,\sqrt{\frac{a-b}{a+b}}\;B\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$\mathbb{i}\,(a-b)\,B\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\,\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}2\,i\,(A\,b-a\,B)\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}4\,i\,A\,b$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)+$$

$$\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}2\,i\,a\,B\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\right.$$

$$\left.\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)+\frac{b\,\sqrt{\frac{a-b}{a+b}}\,B\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]}{2\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}+$$

$$\frac{a\,\sqrt{\frac{a-b}{a+b}}\,B\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}-\frac{b\,\sqrt{\frac{a-b}{a+b}}\,B\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}+\frac{1}{2}\,b\,\sqrt{\frac{a-b}{a+b}}$$

$$B\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-\frac{2\,\sqrt{\frac{a-b}{a+b}}\,(A\,b-a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{1+\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-$$

$$\frac{(a-b)\,\sqrt{\frac{a-b}{a+b}}\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}{\sqrt{1+\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{4\,A\,b\,\sqrt{\frac{a-b}{a+b}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{1+\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-$$

$$\left.\left.\left.\frac{2\,a\,\sqrt{\frac{a-b}{a+b}}\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{1+\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}\right)\right)\right)$$

- **Problem 423: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 230 leaves, 3 steps):

$$\frac{1}{a^2\,d}2\,A\,(a-b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{a\,d}2\,\sqrt{a+b}\,(A-B)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 1164 leaves):

$$\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{1}{a\,d}\left(-\left(4\,a\,(A\,b-a\,B)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4 a^2 A \left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\mathrm{Csc}[c+d x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b)\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\mathrm{Csc}[c+d x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b}, \mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right)\right) +$$

$$2 A b \left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\mathrm{Cos}[c+d x]}}\right], -\frac{2 a}{-a-b}\right] \mathrm{Sec}[c+d x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Sec}[c+d x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Sec}[c+d x]}{a+b}}} +\right.$$

$$\frac{1}{b}\,2 a \left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\mathrm{Csc}[c+d x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b)\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right) -$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 424: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{5/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 290 leaves, 4 steps):

$$-\frac{1}{3\,a^3\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,(2\,A\,b-3\,a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{3\,a^2\,d}2\,\sqrt{a+b}\,(2\,A\,b+a\,(A-3\,B))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1238 leaves):

$$\frac{1}{3\,a^2\,d}$$

$$-\Bigg(\Bigg(4\,a\left(a^2 A+2\,A\,b^2-3\,a\,b\,B\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[$$

$$c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$4\,a\left(2\,a\,A\,b-3\,a^2 B\right)\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+$$

$$d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(2\,A\,b^2-3\,a\,b\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{2\,\text{Sec}[c+d\,x]\,(-2\,A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])}{3a^2}+\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3a}\right)}{d}$$

- **Problem 425: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{7/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 363 leaves, 5 steps):

$$\frac{1}{15 a^4 d}2 (a-b) \sqrt{a+b} \left(9 a^2 A+8 A b^2-10 a b B\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{15 a^3 d} 2 \sqrt{a+b} \left(8 A b^2+a^2 (9 A-5 B)-2 a b (A+5 B)\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 A \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{5 a d \text{Cos}[c+d x]^{5/2}}-\frac{2 (4 A b-5 a B) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{15 a^2 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1319 leaves) :

$$-\frac{1}{15 a^3 d}\left(-\left(\left(4 a \left(7 a^2 A b+8 A b^3-5 a^3 B-10 a b^2 B\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)\right)-4 a \left(9 a^3 A+8 a A b^2-10 a^2 b B\right) \left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-\right.$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\text{Csc}[c+d x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d x]}\;\sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg)+$$

$$2\left(9a^2Ab+8Ab^3-10ab^2B\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\,\text{Cos}[c+d x]}\;\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\text{Cos}[c+d x]}}\right],-\frac{2a}{-a-b}\right]\text{Sec}[c+d x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\text{Sec}[c+d x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\;\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg) + \frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg) +$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\ \left(\frac{2\,\text{Sec}[c+d x]^2\ (-4\,A\,b\,\text{Sin}[c+d x]+5\,a\,B\,\text{Sin}[c+d x])}{15\,a^2}+\right.$$

$$\frac{2\,\text{Sec}[c+d x]\ \left(9\,a^2\,A\,\text{Sin}[c+d x]+8\,A\,b^2\,\text{Sin}[c+d x]-10\,a\,b\,B\,\text{Sin}[c+d x]\right)}{15\,a^3}+$$

$$\left.\frac{2\,A\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{5\,a}\right)$$

- **Problem 426: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{3/2}\ (A+B\,\text{Cos}[c+d x])}{(a+b\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 500 leaves, 7 steps):

$$\frac{1}{a\,b^2\sqrt{a+b}\ d}\left(2\,a\,A\,b-3\,a^2\,B+b^2\,B\right)\text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{b^2\sqrt{a+b}\ d}$$

$$(2\,A\,b-(3\,a+b)\,B)\,\text{Cot}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{b^3\,d}$$

$$\sqrt{a+b}\ (2\,A\,b-3\,a\,B)\,\text{Cot}[c+d x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{2\,a\,(A\,b-a\,B)\,\sqrt{\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d x]}}-\frac{\left(2\,a\,A\,b-3\,a^2\,B+b^2\,B\right)\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b^2\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d x]}}$$

Result (type 4, 1234 leaves):

$$\frac{2\sqrt{\text{Cos}[c+d x]}\ \left(-a\,A\,b\,\text{Sin}[c+d x]+a^2\,B\,\text{Sin}[c+d x]\right)}{b\left(-a^2+b^2\right)d\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{1}{2\,(a-b)\,b\,(a+b)\,d}$$

$$\left(-\left(4\,a\,\left(a^2\,B-b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\,\left(-2\,A\,b^2+2\,a\,b\,B\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+\right.\right.$$

$$\left.d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-2\,a\,A\,b+3\,a^2\,B-b^2\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 427: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,(A+B\,\mathrm{Cos}[c+d\,x])}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 416 leaves, 6 steps):

$$-\frac{2\,(A\,b-a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a\,b\,\sqrt{a+b}\,d}+$$

$$\frac{2\,(A\,b-a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a\,b\,\sqrt{a+b}\,d}-\frac{1}{b^2\,d}$$

$$2\,\sqrt{a+b}\,B\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(A\,b-a\,B)\,\text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1012 leaves) :

$$\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,(-A\,b\,\text{Sin}[c+d\,x]+a\,B\,\text{Sin}[c+d\,x])}{\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{1}{(-a+b)\,(a+b)\,d}$$

$$\Bigg(-4\,a\,(a\,A-b\,B)\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(A\,b-a\,B)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 428: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]}{\sqrt{\mathrm{Cos}[c+d\,x]}\;(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 284 leaves, 4 steps):

$$\frac{2\,(A\,b-a\,B)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{a^2\,\sqrt{a+b}\,d}+$$

$$\frac{2\,(A+B)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{a\,\sqrt{a+b}\,d}-\frac{2\,(A\,b-a\,B)\,\mathrm{Sin}[c+d\,x]}{\left(a^2-b^2\right)\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 1223 leaves) :

$$-\frac{2\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(-A\,b^2\,\mathrm{Sin}[c+d\,x]+a\,b\,B\,\mathrm{Sin}[c+d\,x]\right)}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{a\,(a-b)\,(a+b)\,d}$$

$$\left(-\left(4\,a\,\left(a^2\,A-A\,b^2\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a$$

$$\left(-a\,A\,b+a^2\,B\right)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/ \left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$2\left(-A\,b^2+a\,b\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}} +$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/ \left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right) -$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\;\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) + \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 429: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\operatorname{Cos}[c+d x]}{\operatorname{Cos}[c+d x]^{3/2}\,(a+b\operatorname{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 305 leaves, 4 steps):

$$\frac{1}{a^3\sqrt{a+b}\,d}2\left(a^2 A-2 A b^2+a b B\right)\operatorname{Cot}[c+d x]\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d x])}{a-b}}-\frac{1}{a^2\sqrt{a+b}\,d}2\,(2 A b+a\,(A-B))\operatorname{Cot}[c+d x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{2 b\,(A b-a B)\operatorname{Sin}[c+d x]}{a\left(a^2-b^2\right)d\sqrt{\operatorname{Cos}[c+d x]}\,\sqrt{a+b\operatorname{Cos}[c+d x]}}$$

Result (type 4, 1281 leaves):

$$\frac{1}{a^2\,(-a+b)\,(a+b)\,d}\left(-\left(4 a\left(2 a^2 A b-2 A b^3-a^3 B+a b^2 B\right)\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d x]\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\operatorname{Csc}[c+d x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+d x]}\,\sqrt{a+b\operatorname{Cos}[c+d x]}\right)-4 a\left(a^3 A-2 a A b^2+a^2 b B\right)\left(\left(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d x]\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\operatorname{Csc}[c+d x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+d x]}\,\sqrt{a+b\operatorname{Cos}[c+d x]}\right)-\right.\right.$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(a^2\,A\,b-2\,A\,b^3+a\,b^2\,B\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2\,\left(-A\,b^3\,\mathrm{Sin}[c+d\,x]+a\,b^2\,B\,\mathrm{Sin}[c+d\,x]\right)}{a^2\,\left(a^2-b^2\right)\,(a+b\,\mathrm{Cos}[c+d\,x])}+\frac{2\,A\,\mathrm{Tan}[c+d\,x]}{a^2}\right)}{d}$$

- **Problem 430: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 393 leaves, 5 steps):

$$-\frac{1}{3\,a^4\,\sqrt{a+b}\;d}2\,\left(5\,a^2\,A\,b-8\,A\,b^3-3\,a^3\,B+6\,a\,b^2\,B\right)\,\mathrm{Cot}[c+d\,x]$$
$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a^3\,\sqrt{a+b}\;d}$$
$$2\,(a+2\,b)\,(4\,A\,b+a\,(A-3\,B))\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,b\,(A\,b-a\,B)\,\mathrm{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(a^2\,A-4\,A\,b^2+3\,a\,b\,B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1357 leaves):

$$\frac{1}{3\,a^3\,(a-b)\,(a+b)\,d}\left(-\left(4\,a\,\left(a^4\,A+7\,a^2\,A\,b^2-8\,A\,b^4-6\,a^3\,b\,B+6\,a\,b^3\,B\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$
$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(5\,a^3\,A\,b-8\,a\,A\,b^3-3\,a^4\,B+6\,a^2\,b^2\,B\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(5\,a^2\,A\,b^2-8\,A\,b^4-3\,a^3\,b\,B+6\,a\,b^3\,B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}} \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right) \Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right) + \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right) +$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\text{Sec}[c+d\,x]\,(-5\,A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])}{3\,a^3} - \right.$$

$$\frac{2\left(-A\,b^4\,\text{Sin}[c+d\,x]+a\,b^3\,B\,\text{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])} +$$

$$\left.\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a^2}\right)$$

- **Problem 431: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d\,x]^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 674 leaves, 8 steps) :

$$\frac{1}{3\,a\,(a-b)\,b^3\,(a+b)^{3/2}\,d}\left(6\,a^3\,A\,b-14\,a\,A\,b^3-15\,a^4\,B+26\,a^2\,b^2\,B-3\,b^4\,B\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{3\,(a-b)\,b^3\,(a+b)^{3/2}\,d}\left(6\,a^2\,A\,b+2\,a\,A\,b^2-12\,A\,b^3-15\,a^3\,B-5\,a^2\,b\,B+21\,a\,b^2\,B+3\,b^3\,B\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{b^4\,d}$$

$$\sqrt{a+b}\,(2\,A\,b-5\,a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{2\,a\,(A\,b-a\,B)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\,a\,\left(2\,a^2\,A\,b-6\,A\,b^3-5\,a^3\,B+9\,a\,b^2\,B\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{\left(6\,a^3\,A\,b-14\,a\,A\,b^3-15\,a^4\,B+26\,a^2\,b^2\,B-3\,b^4\,B\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b^3\,\left(a^2-b^2\right)^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1396 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(-\frac{2\,\left(-a^2\,A\,b\,\text{Sin}[c+d\,x]+a^3\,B\,\text{Sin}[c+d\,x]\right)}{3\,b^2\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{2\,\left(-3\,a^3\,A\,b\,\text{Sin}[c+d\,x]+7\,a\,A\,b^3\,\text{Sin}[c+d\,x]+6\,a^4\,B\,\text{Sin}[c+d\,x]-10\,a^2\,b^2\,B\,\text{Sin}[c+d\,x]\right)}{3\,b^2\,\left(-a^2+b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)+$$

$$\frac{1}{6\,(a-b)^2\,b^2\,(a+b)^2\,d}\left(\left(-4\,a\,\left(-2\,a^3\,A\,b+2\,a\,A\,b^3+5\,a^4\,B-8\,a^2\,b^2\,B+3\,b^4\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(2\,a^2\,A\,b^2+6\,A\,b^4+4\,a^3\,b\,B-12\,a\,b^3\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\,\left(-6\,a^3\,A\,b+14\,a\,A\,b^3+15\,a^4\,B-26\,a^2\,b^2\,B+3\,b^4\,B\right)$$

$$\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 432: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 545 leaves, 7 steps) :

$$\frac{1}{3\,a\,(a-b)\,b^2\,(a+b)^{3/2}\,d}$$

$$2\left(4\,A\,b^3+3\,a^3\,B-7\,a\,b^2\,B\right)\operatorname{Cot}[c+d\,x]\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{3\,a\,(a-b)\,b^2\,(a+b)^{3/2}\,d}2\left(a\,A\,b^2-3\,A\,b^3-3\,a^3\,B-a^2\,b\,B+6\,a\,b^2\,B\right)\operatorname{Cot}[c+d\,x]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^3\,d}$$

$$2\sqrt{a+b}\,B\operatorname{Cot}[c+d\,x]\operatorname{EllipticPi}\left[\frac{a+b}{b},\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(A\,b-a\,B)\sqrt{\operatorname{Cos}[c+d\,x]}\operatorname{Sin}[c+d\,x]}{3\,b\left(a^2-b^2\right)d\,(a+b\operatorname{Cos}[c+d\,x])^{3/2}}-\frac{2\,a\left(4\,A\,b^3+3\,a^3\,B-7\,a\,b^2\,B\right)\operatorname{Sin}[c+d\,x]}{3\,b^2\left(a^2-b^2\right)^2 d\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}}$$

Result (type 4, 1342 leaves):

$$\frac{1}{d}\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\left(\frac{2\left(-a\,A\,b\operatorname{Sin}[c+d\,x]+a^2\,B\operatorname{Sin}[c+d\,x]\right)}{3\,b\left(-a^2+b^2\right)(a+b\operatorname{Cos}[c+d\,x])^2}+\frac{2\left(4\,A\,b^3\operatorname{Sin}[c+d\,x]+3\,a^3\,B\operatorname{Sin}[c+d\,x]-7\,a\,b^2\,B\operatorname{Sin}[c+d\,x]\right)}{3\,b\left(-a^2+b^2\right)^2(a+b\operatorname{Cos}[c+d\,x])}\right)-$$

$$\frac{1}{3\,(a-b)^2\,b\,(a+b)^2\,d}\left(-\left(4\,a\left(-a^2\,A\,b+A\,b^3+a^3\,B-a\,b^2\,B\right)\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d\,x]\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\operatorname{Csc}[c+d\,x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\right)-4\,a\left(4\,a\,A\,b^2-a^2\,b\,B-3\,b^3\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d\,x]\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\operatorname{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(4\,A\,b^3+3\,a^3\,B-7\,a\,b^2\,B\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d x]\ \text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Bigg/$$

$$\left(b \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)\right) + \frac{\sqrt{a+b \text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b \sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg)$$

## Problem 433: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{\text{Cos}[c+d x]}\ (A+B \text{Cos}[c+d x])}{(a+b \text{Cos}[c+d x])^{5/2}}\, dx$$

Optimal (type 4, 391 leaves, 5 steps):

$$-\frac{1}{3 a^2 (a-b) (a+b)^{3/2} d} 2 \left(3 a^2 A+A b^2-4 a b B\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{3 a (a-b) (a+b)^{3/2} d}$$

$$2 (3 a A-A b+a B-3 b B) \text{Cot}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{2 (A b-a B) \sqrt{\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{3 \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x])^{3/2}} + \frac{2 \left(3 a^2 A+A b^2-4 a b B\right) \text{Sin}[c+d x]}{3 \left(a^2-b^2\right)^2 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}}$$

Result (type 4, 1335 leaves):

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]} \left(\frac{2 (-A b \text{Sin}[c+d x]+a B \text{Sin}[c+d x])}{3 \left(a^2-b^2\right) (a+b \text{Cos}[c+d x])^2} - \frac{2 \left(3 a^2 A b \text{Sin}[c+d x]+A b^3 \text{Sin}[c+d x]-4 a b^2 B \text{Sin}[c+d x]\right)}{3 a \left(a^2-b^2\right)^2 (a+b \text{Cos}[c+d x])}\right) +$$

$$\frac{1}{3 a (a-b)^2 (a+b)^2 d} \left(-\left(4 a \left(-a^2 A b+A b^3+a^3 B-a b^2 B\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(3\,a^3\,A+a\,A\,b^2-4\,a^2\,b\,B\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(3\,a^2\,A\,b+A\,b^3-4\,a\,b^2\,B\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 434: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 429 leaves, 5 steps) :

$$\frac{1}{3\,a^3\,(a-b)\,(a+b)^{3/2}\,d}2\left(6\,a^2\,A\,b-2\,A\,b^3-3\,a^3\,B-a\,b^2\,B\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,a^2\sqrt{a+b}\,\left(a^2-b^2\right)d}$$

$$2\left(2\,A\,b^2-3\,a^2\,(A+B)+a\,b\,(3\,A+B)\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,b\,(A\,b-a\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}-\frac{2\left(6\,a^2\,A\,b-2\,A\,b^3-3\,a^3\,B-a\,b^2\,B\right)\text{Sin}[c+d\,x]}{3\,a\left(a^2-b^2\right)^2d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1384 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(-\frac{2\left(-A\,b^2\,\text{Sin}[c+d\,x]+a\,b\,B\,\text{Sin}[c+d\,x]\right)}{3\,a\left(a^2-b^2\right)\left(a+b\,\text{Cos}[c+d\,x]\right)^2}-\frac{2\left(-6\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]+2\,A\,b^4\,\text{Sin}[c+d\,x]+3\,a^3\,b\,B\,\text{Sin}[c+d\,x]+a\,b^3\,B\,\text{Sin}[c+d\,x]\right)}{3\,a^2\left(a^2-b^2\right)^2\left(a+b\,\text{Cos}[c+d\,x]\right)}\right)+$$

$$\frac{1}{3\,a^2\,(a-b)^2\,(a+b)^2\,d}\left(-\left(4\,a\left(3\,a^4\,A-5\,a^2\,A\,b^2+2\,A\,b^4-a^3\,b\,B+a\,b^3\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-6\,a^3\,A\,b+2\,a\,A\,b^3+3\,a^4\,B+a^2\,b^2\,B\right)$$

$$\left(\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-6a^2Ab^2+2Ab^4+3a^3bB+ab^3B\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]\sqrt{a+b\,\mathrm{Cos}[c+dx]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{2a}{-a-b}\right]\mathrm{Sec}[c+dx]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]^2\mathrm{Sec}[c+dx]}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Sec}[c+dx]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\;\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\;\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)\right)$$

- **Problem 435: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+dx]}{\mathrm{Cos}[c+dx]^{3/2}\,(a+b\,\mathrm{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 4, 456 leaves, 5 steps) :

$$\frac{1}{3 a^4 (a-b) (a+b)^{3/2} d} 2 \left(3 a^4 A - 15 a^2 A b^2 + 8 A b^4 + 6 a^3 b B - 2 a b^3 B\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{3 a^3 \sqrt{a+b} \left(a^2-b^2\right) d} 2 \left(8 A b^3 - 3 a^3 (A-B) + 2 a b^2 (3 A-B) - 3 a^2 b (3 A+B)\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{2 b (A b - a B) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \sqrt{\text{Cos}[c+d x]} (a+b \text{Cos}[c+d x])^{3/2}} + \frac{2 b \left(8 a^2 A b - 4 A b^3 - 5 a^3 B + a b^2 B\right) \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}}$$

Result (type 4, 1431 leaves) :

$$-\frac{1}{3 a^3 (a-b)^2 (a+b)^2 d} \left(-\left(4 a \left(9 a^4 A b - 17 a^2 A b^3 + 8 A b^5 - 3 a^5 B + 5 a^3 b^2 B - 2 a b^4 B\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \middle/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) - 4 a \left(3 a^5 A - 15 a^3 A b^2 + 8 a A b^4 + 6 a^4 b B - 2 a^2 b^3 B\right) \left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \middle/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) - \right.\right.$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(3\,a^4\,A\,b-15\,a^2\,A\,b^3+8\,A\,b^5+6\,a^3\,b^2\,B-2\,a\,b^4\,B\right)$$

$$\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d x]\ \text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg) \Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg) + \frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg) +$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\ \left(\frac{2\left(-A\,b^3\,\text{Sin}[c+d x]+a\,b^2\,B\,\text{Sin}[c+d x]\right)}{3 a^2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d x])^2}+\right.$$

$$\frac{2\left(-9 a^2 A\,b^3\,\text{Sin}[c+d x]+5 A\,b^5\,\text{Sin}[c+d x]+6 a^3 b^2 B\,\text{Sin}[c+d x]-2 a\,b^4 B\,\text{Sin}[c+d x]\right)}{3 a^3\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d x])}+$$

$$\left.\frac{2 A\,\text{Tan}[c+d x]}{a^3}\right)$$

- **Problem 436: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\text{Cos}[c+d x]}{\text{Cos}[c+d x]^{5/2}\,(a+b\,\text{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 4, 567 leaves, 6 steps) :

$$-\frac{1}{3 a^5 (a-b) (a+b)^{3/2} d} 2 \left(8 a^4 A b - 28 a^2 A b^3 + 16 A b^5 - 3 a^5 B + 15 a^3 b^2 B - 8 a b^4 B\right)$$

$$\text{Cot}[c+d x] \, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{1}{3 a^4 \sqrt{a+b} \left(a^2-b^2\right) d} 2 \left(16 A b^4 - a^4 (A-3 B) + 4 a b^3 (3 A-2 B) - 9 a^3 b (A-B) - 2 a^2 b^2 (8 A+3 B)\right) \text{Cot}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 b (A b - a B) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \text{Cos}[c+d x]^{3/2} (a+b \text{Cos}[c+d x])^{3/2}} + \frac{2 b \left(10 a^2 A b - 6 A b^3 - 7 a^3 B + 3 a b^2 B\right) \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \text{Cos}[c+d x]^{3/2} \sqrt{a+b \text{Cos}[c+d x]}} +$$

$$\frac{2 \left(a^4 A - 13 a^2 A b^2 + 8 A b^4 + 8 a^3 b B - 4 a b^3 B\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1499 leaves):

$$\frac{1}{3 a^4 (a-b)^2 (a+b)^2 d}$$

$$\left(-\left(4 a \left(a^6 A + 15 a^4 A b^2 - 32 a^2 A b^4 + 16 A b^6 - 9 a^5 b B + 17 a^3 b^3 B - 8 a b^5 B\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) - 4 a \left(8 a^5 A b - 28 a^3 A b^3 + 16 a A b^5 - 3 a^6 B + 15 a^4 b^2 B - 8 a^2 b^4 B\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+2\,\left(8\,a^4\,A\,b^2-28\,a^2\,A\,b^4+16\,A\,b^6-3\,a^5\,b\,B+15\,a^3\,b^3\,B-8\,a\,b^5\,B\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(\frac{2\,\text{Sec}[c+d\,x]\,(-8\,A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])}{3\,a^4}-\frac{2\left(-A\,b^4\,\text{Sin}[c+d\,x]+a\,b^3\,B\,\text{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\right.$$

$$\frac{2\left(-12\,a^2\,A\,b^4\,\text{Sin}[c+d\,x]+8\,A\,b^6\,\text{Sin}[c+d\,x]+9\,a^3\,b^3\,B\,\text{Sin}[c+d\,x]-5\,a\,b^5\,B\,\text{Sin}[c+d\,x]\right)}{3\,a^4\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}+$$

$$\left.\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a^3}\right)$$

- **Problem 437: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,(a\,B+b\,B\,\text{Cos}[c+d\,x])}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 419 leaves, 9 steps) :

$$-\frac{1}{a\,b\,d}(a-b)\sqrt{a+b}\;B\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\sqrt{a+b}\;B\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{b\,d}+\frac{1}{b^2\,d}$$

$$a\sqrt{a+b}\;B\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{a\,B\,\mathrm{Sin}[c+d\,x]}{b\,d\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{B\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 480 leaves) :

$$\frac{1}{2\,b\sqrt{\frac{a-b}{a+b}}\;d\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

$$B\sqrt{\mathrm{Cos}[c+d\,x]}\;\Bigg(2\,\mathrm{i}\,(a-b)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-$$

$$4\,\mathrm{i}\,a\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+$$

$$4\,\mathrm{i}\,a\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+b\sqrt{\frac{a-b}{a+b}}\;\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\sqrt{\frac{a-b}{a+b}}\;\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\sqrt{\frac{a-b}{a+b}}\;\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)$$

- **Problem 440: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{a\,B+b\,B\,\mathrm{Cos}[c+d\,x]}{\mathrm{Cos}[c+d\,x]^{3/2}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 226 leaves, 4 steps) :

$$\frac{1}{a^2 d}2\,(a-b)\,\sqrt{a+b}\,B\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{2\,\sqrt{a+b}\,B\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{a\,d}$$

Result (type 4, 896 leaves) :

$$B\left(\frac{1}{d}4\,a\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$\frac{2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{1}{a\,\sqrt{\frac{a-b}{a+b}}\,d\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\left(2\,i\,(a-b)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]-\right.$$

$$4\,i\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]+$$

$$4\,i\,a\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]+b\sqrt{\frac{a-b}{a+b}}\;\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\,a\sqrt{\frac{a-b}{a+b}}\;\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\sqrt{\frac{a-b}{a+b}}\;\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)$$

## Problem 441: Unable to integrate problem.

$$\int\frac{1+\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\sqrt{2+3\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 72 leaves, 1 step):

$$-\frac{\text{Cot}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{2+3\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,5\right]\sqrt{-1-\text{Sec}[c+d\,x]}\;\sqrt{1-\text{Sec}[c+d\,x]}}{d}$$

Result (type 8, 35 leaves):

$$\int\frac{1+\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\sqrt{2+3\,\text{Cos}[c+d\,x]}}\,dx$$

## Problem 442: Attempted integration timed out after 120 seconds.

$$\int\frac{1+\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\sqrt{-2+3\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 70 leaves, 1 step):

$$-\frac{\sqrt{5}\;\text{Cot}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{-2+3\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,\frac{1}{5}\right]\sqrt{-1+\text{Sec}[c+d\,x]}\;\sqrt{1+\text{Sec}[c+d\,x]}}{d}$$

Result (type 1, 1 leaves):

???

## Problem 443: Attempted integration timed out after 120 seconds.

$$\int\frac{1+\text{Cos}[c+d\,x]}{\sqrt{2-3\,\text{Cos}[c+d\,x]}\;\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 93 leaves, 2 steps):

$$\frac{1}{d}\sqrt{5}\,\sqrt{-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{2-3\,\text{Cos}[c+d\,x]}}{\sqrt{-\text{Cos}[c+d\,x]}}\right],\frac{1}{5}\right]\sqrt{-1+\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}$$

Result (type 1, 1 leaves):

???

## Problem 444: Unable to integrate problem.

$$\int \frac{1+\text{Cos}[c+d\,x]}{\sqrt{-2-3\,\text{Cos}[c+d\,x]}\,\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 95 leaves, 2 steps):

$$\frac{1}{d}\sqrt{-\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{-2-3\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{-\text{Cos}[c+d\,x]}}\right],5\right]\sqrt{-1-\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]}$$

Result (type 8, 35 leaves):

$$\int \frac{1+\text{Cos}[c+d\,x]}{\sqrt{-2-3\,\text{Cos}[c+d\,x]}\,\text{Cos}[c+d\,x]^{3/2}}\,dx$$

## Problem 445: Unable to integrate problem.

$$\int \frac{1+\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\,\sqrt{3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 72 leaves, 1 step):

$$\frac{2\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{3+2\,\text{Cos}[c+d\,x]}}{\sqrt{5}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-5\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{3\,d}$$

Result (type 8, 35 leaves):

$$\int \frac{1+\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\,\sqrt{3+2\,\text{Cos}[c+d\,x]}}\,dx$$

## Problem 446: Unable to integrate problem.

$$\int \frac{1+\text{Cos}[c+d\,x]}{\sqrt{3-2\,\text{Cos}[c+d\,x]}\,\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 74 leaves, 1 step):

$$\frac{2\sqrt{5}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{3-2\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{1}{5}\right]\sqrt{1-\text{Sec}[c+d\,x]}\,\sqrt{1+\text{Sec}[c+d\,x]}}{3\,d}$$

Result (type 8, 35 leaves):

$$\int \frac{1+\text{Cos}[c+d\,x]}{\sqrt{3-2\,\text{Cos}[c+d\,x]}\;\text{Cos}[c+d\,x]^{3/2}}\,dx$$

- **Problem 447: Attempted integration timed out after 120 seconds.**

$$\int \frac{1+\text{Cos}[c+d\,x]}{\text{Cos}[c+d\,x]^{3/2}\,\sqrt{-3+2\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 98 leaves, 2 steps) :

$$-\frac{1}{3\,d}2\,\sqrt{5}\;\sqrt{-\text{Cos}[c+d\,x]}\;\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{-3+2\,\text{Cos}[c+d\,x]}}{\sqrt{-\text{Cos}[c+d\,x]}}\right],\,-\frac{1}{5}\right]\sqrt{1-\text{Sec}[c+d\,x]}\;\sqrt{1+\text{Sec}[c+d\,x]}$$

Result (type 1, 1 leaves) :

???

- **Problem 448: Unable to integrate problem.**

$$\int \frac{1+\text{Cos}[c+d\,x]}{\sqrt{-3-2\,\text{Cos}[c+d\,x]}\;\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 96 leaves, 2 steps) :

$$-\frac{1}{3\,d}2\,\sqrt{-\text{Cos}[c+d\,x]}\;\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{-3-2\,\text{Cos}[c+d\,x]}}{\sqrt{5}\;\sqrt{-\text{Cos}[c+d\,x]}}\right],\,-5\right]\sqrt{1-\text{Sec}[c+d\,x]}\;\sqrt{1+\text{Sec}[c+d\,x]}$$

Result (type 8, 35 leaves) :

$$\int \frac{1+\text{Cos}[c+d\,x]}{\sqrt{-3-2\,\text{Cos}[c+d\,x]}\;\text{Cos}[c+d\,x]^{3/2}}\,dx$$

- **Problem 451: Result more than twice size of optimal antiderivative.**

$$\int (c\,\text{Cos}[e+f\,x])^m\,(a+b\,\text{Cos}[e+f\,x])^3\,(A+B\,\text{Cos}[e+f\,x])\,dx$$

Optimal (type 5, 406 leaves, 6 steps) :

$$\frac{b\left(b^2 B (3+m)+3 a A b (4+m)+2 a^2 B (5+m)\right) (c \text{Cos}[e+f x])^{1+m} \text{Sin}[e+f x]}{c f (2+m) (4+m)}+$$

$$\frac{b^2 (A b (4+m)+a B (6+m)) \text{Cos}[e+f x] (c \text{Cos}[e+f x])^{1+m} \text{Sin}[e+f x]}{c f (3+m) (4+m)}+\frac{b B (c \text{Cos}[e+f x])^{1+m} (a+b \text{Cos}[e+f x])^2 \text{Sin}[e+f x]}{c f (4+m)}-$$

$$\left(\left(a^2 (2+m) (b B (1+m)+a A (4+m))+b (1+m) \left(b^2 B (3+m)+3 a A b (4+m)+2 a^2 B (5+m)\right)\right) (c \text{Cos}[e+f x])^{1+m}\right.$$

$$\left.\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \text{Cos}[e+f x]^2\right] \text{Sin}[e+f x]\right) \Big/ \left(c f (1+m) (2+m) (4+m) \sqrt{\text{Sin}[e+f x]^2}\right)-$$

$$\left(\left(A b^3 (2+m)+3 a b^2 B (2+m)+3 a^2 A b (3+m)+a^3 B (3+m)\right) (c \text{Cos}[e+f x])^{2+m}\right.$$

$$\left.\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \text{Cos}[e+f x]^2\right] \text{Sin}[e+f x]\right) \Big/ \left(c^2 f (2+m) (3+m) \sqrt{\text{Sin}[e+f x]^2}\right)$$

Result (type 5, 967 leaves) :

$$\left((c\,\text{Cos}[e+f\,x])^m\,(a+b\,\text{Cos}[e+f\,x])^3\,(A+B\,\text{Cos}[e+f\,x])\,\text{Sec}[e+f\,x]^4\,\left(\text{Sec}[e+f\,x]^2\right)^{\frac{1+m}{2}}\right.$$
$$\left(a^3\,A\,\text{Hypergeometric2F1}\left[\frac{1}{2},3+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+3\,a\,A\,b^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},3+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+\right.$$
$$3\,a^2\,b\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},3+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+b^3\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},3+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+$$
$$3\,a^2\,A\,b\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+$$
$$A\,b^3\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+a^3\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+$$
$$3\,a\,b^2\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]+\frac{2}{3}\,a^3\,A\,\text{Hypergeometric2F1}\left[\frac{3}{2},3+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]$$
$$\text{Tan}[e+f\,x]^3+a\,A\,b^2\,\text{Hypergeometric2F1}\left[\frac{3}{2},3+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^3+$$
$$a^2\,b\,B\,\text{Hypergeometric2F1}\left[\frac{3}{2},3+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^3+2\,a^2\,A\,b\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]$$
$$\text{Tan}[e+f\,x]^3+\frac{1}{3}\,A\,b^3\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^3+\frac{2}{3}\,a^3\,B$$
$$\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^3+a\,b^2\,B\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}+\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^3+$$
$$\frac{1}{5}\,a^3\,A\,\text{Hypergeometric2F1}\left[\frac{5}{2},3+\frac{m}{2},\frac{7}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^5+\frac{3}{5}\,a^2\,A\,b\,\text{Hypergeometric2F1}\left[\frac{5}{2},\frac{7}{2}+\frac{m}{2},\frac{7}{2},-\text{Tan}[e+f\,x]^2\right]$$
$$\left.\left.\text{Tan}[e+f\,x]^5+\frac{1}{5}\,a^3\,B\,\text{Hypergeometric2F1}\left[\frac{5}{2},\frac{7}{2}+\frac{m}{2},\frac{7}{2},-\text{Tan}[e+f\,x]^2\right]\text{Tan}[e+f\,x]^5\right)\right)\Big/$$
$$\left(f\left(a^3\left(B+A\sqrt{\text{Sec}[e+f\,x]^2}\right)+3\,a\,b^2\left(B+A\sqrt{\text{Sec}[e+f\,x]^2}\right)+3\,a^2\,b\left(A+B\sqrt{\text{Sec}[e+f\,x]^2}\right)+b^3\left(A+B\sqrt{\text{Sec}[e+f\,x]^2}\right)+\right.\right.$$
$$\left(A\,b^3+2\,a^3\left(B+A\sqrt{\text{Sec}[e+f\,x]^2}\right)+3\,a\,b^2\left(B+A\sqrt{\text{Sec}[e+f\,x]^2}\right)+3\,a^2\,b\left(2\,A+B\sqrt{\text{Sec}[e+f\,x]^2}\right)\right)\text{Tan}[e+f\,x]^2+$$
$$\left.\left.a^2\left(3\,A\,b+a\,B+a\,A\sqrt{\text{Sec}[e+f\,x]^2}\right)\text{Tan}[e+f\,x]^4\right)\right)$$

- **Problem 454: Result more than twice size of optimal antiderivative.**

$$\int\frac{(c\,\text{Cos}[e+f\,x])^m\,(A+B\,\text{Cos}[e+f\,x])}{a+b\,\text{Cos}[e+f\,x]}\,dx$$

Optimal (type 6, 286 leaves, 7 steps) :

$$\frac{1}{b\left(a^2-b^2\right)f}a\,(A\,b-a\,B)\,c\,\text{AppellF1}\left[\frac{1}{2},\frac{1-m}{2},1,\frac{3}{2},\text{Sin}[e+f\,x]^2,-\frac{b^2\,\text{Sin}[e+f\,x]^2}{a^2-b^2}\right](c\,\text{Cos}[e+f\,x])^{-1+m}\left(\text{Cos}[e+f\,x]^2\right)^{\frac{1-m}{2}}\text{Sin}[e+f\,x]-$$
$$\frac{1}{\left(a^2-b^2\right)f}(A\,b-a\,B)\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},\text{Sin}[e+f\,x]^2,-\frac{b^2\,\text{Sin}[e+f\,x]^2}{a^2-b^2}\right](c\,\text{Cos}[e+f\,x])^m\left(\text{Cos}[e+f\,x]^2\right)^{-m/2}\text{Sin}[e+f\,x]-$$
$$\frac{B\,(c\,\text{Cos}[e+f\,x])^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[e+f\,x]^2\right]\text{Sin}[e+f\,x]}{b\,c\,f\,(1+m)\sqrt{\text{Sin}[e+f\,x]^2}}$$

Result (type 6, 10 482 leaves) :

$$\left(\text{Cos}[e+f\,x]^{-1-m}\,(c\,\text{Cos}[e+f\,x])^m\left(\frac{A\,\text{Cos}[e+f\,x]^m}{a+b\,\text{Cos}[e+f\,x]}+\frac{B\,\text{Cos}[e+f\,x]^{1+m}}{a+b\,\text{Cos}[e+f\,x]}\right)\text{Sin}[e+f\,x]\left(\frac{B\,\text{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]}{b}+\right.\right.$$
$$\frac{A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]}{b}-\frac{a\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3}{2},-\text{Tan}[e+f\,x]^2\right]}{b^2}+$$
$$\left(3\,a^2\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$
$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)-$$
$$\left(3\,a^3\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$
$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)-$$
$$\left(3\,a\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\left(1+\text{Tan}[e+f\,x]^2\right)^{-m/2}\right)\Big/$$
$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)+$$

$$\left(3\,a^2\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left.\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)\right)\right)\Big/$$

$$\left(f\,\left(\text{Sec}[e+f\,x]^2\,\left(\frac{B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,1+\frac{m}{2},\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2\right]}{b}+\frac{A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1+m}{2},\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2\right]}{b}-\right.\right.\right.$$

$$\frac{a\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1+m}{2},\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2\right]}{b^2}+$$

$$\left(3\,a^2\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)-$$

$$\left(3\,a^3\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^2\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)-$$

$$\left(3\,a\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{-m/2}\right)\Big/\left(\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)+$$

$$\left(3\,a^2\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{-m/2}\right)\Big/\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)+$$

$$\text{Tan}[e+f\,x]\,\left(-\left(6\,a^4\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\right)+\right.$$

$$\left(6\,a^5\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/\left(b^2\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\right)+$$

$$\left(6\,a^3\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\right)-$$

$$\left(6\,a^4\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\left(1+\text{Tan}[e+f\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\right)+$$

$$\left(6\,a^2\,A\left(a^2-b^2\right)\left(\frac{1}{2}-\frac{m}{2}\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\right.$$

$$\left.\left(1+\text{Tan}[e+f\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)\Big/\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)-$$

$$\left(6\,a^3\left(a^2-b^2\right)B\left(\frac{1}{2}-\frac{m}{2}\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\right.$$

$$\left.\left(1+\text{Tan}[e+f\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)\Big/\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f\,x]^2\right)\right)\right)+$$

$$\left(3\,a^2\,A\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]+\right.\right.$$

$$\left.1\Big/\left(3\left(-a^2+b^2\right)\right)2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\right)$$

$$\left.\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)-$$

$$\Big(3\,a^3\,\left(a^2-b^2\right)\,B\,\Big(-\frac{1}{3}\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{1}{2}\,(-1+m),\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]+$$

$$1\Big/\left(3\,\left(-a^2+b^2\right)\right)2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\Big)$$

$$\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Big)\Big/\Big(b^2\,\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)+$$

$$\Big(3\,a\,A\,\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{-1-\frac{m}{2}}\Big)\Big/$$

$$\Big(\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)-$$

$$\Big(3\,a^2\,\left(a^2-b^2\right)\,B\,m\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{-1-\frac{m}{2}}\Big)\Big/$$

$$\Big(b\,\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)-$$

$$\Big(3\,a\,A\,\left(a^2-b^2\right)\,\Big(-\frac{1}{3}\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]-$$

$$\frac{2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]}{3 \left(a^2-b^2\right)}\Bigg) \left(1+\text{Tan}[e+f x]^2\right)^{-m/2}\Bigg) \Big/ \Bigg(\Bigg(-3 \left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] +$$

$$\left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[e+f x]^2\Bigg) \left(-b^2+a^2 \left(1+\text{Tan}[e+f x]^2\right)\right)\Bigg) +$$

$$\Bigg(3 a^2 \left(a^2-b^2\right) B \Bigg(-\frac{1}{3} m \text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, \frac{a^2 \text{Tan}[e+f x]^2}{-a^2+b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] +$$

$$\frac{2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, \frac{a^2 \text{Tan}[e+f x]^2}{-a^2+b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]}{3 \left(-a^2+b^2\right)}\Bigg) \left(1+\text{Tan}[e+f x]^2\right)^{-m/2}\Bigg) \Big/ \Bigg(b \Bigg(-3 \left(a^2-b^2\right)$$

$$\text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] +$$

$$\left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[e+f x]^2\Bigg) \left(-b^2+a^2 \left(1+\text{Tan}[e+f x]^2\right)\right)\Bigg) +$$

$$\frac{1}{b} A \text{Csc}[e+f x] \text{Sec}[e+f x] \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3}{2}, -\text{Tan}[e+f x]^2\right] + \left(1+\text{Tan}[e+f x]^2\right)^{\frac{1}{2}(-1-m)}\right) - \frac{1}{b^2}$$

$$a B \text{Csc}[e+f x] \text{Sec}[e+f x] \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3}{2}, -\text{Tan}[e+f x]^2\right] + \left(1+\text{Tan}[e+f x]^2\right)^{\frac{1}{2}(-1-m)}\right) +$$

$$\frac{1}{b} B \text{Csc}[e+f x] \text{Sec}[e+f x] \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, 1+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[e+f x]^2\right] + \left(1+\text{Tan}[e+f x]^2\right)^{-1-\frac{m}{2}}\right) -$$

$$\Bigg(3 a^2 A \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, \frac{a^2 \text{Tan}[e+f x]^2}{-a^2+b^2}\right]$$

$$\left(1+\text{Tan}[e+f x]^2\right)^{\frac{1}{2}-\frac{m}{2}} \Bigg(2 \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] +$$

$$\left(a^2-b^2\right) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg) \text{Sec}[e+f x]^2 \text{Tan}[e+f x] -$$

$$3 \left(a^2-b^2\right) \Bigg(-\frac{1}{3} (-1+m) \text{AppellF1}\left[\frac{3}{2}, 1+\frac{1}{2}(-1+m), 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] -$$

$$\frac{1}{3 \left(a^2-b^2\right)} 2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\Bigg) +$$

$$\text{Tan}[e+f x]^2 \left(2 a^2 \left(-\frac{3}{5} (-1+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{1}{2} (-1+m), 2, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{1}{5 \left(a^2-b^2\right)} 12 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{1}{2} (-1+m), 3, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\right) + \left(a^2-b^2\right) (-1+m) \left(-\frac{1}{5 \left(a^2-b^2\right)} 6 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{1+m}{2}, 2, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{3}{5} (1+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{1+m}{2}, 1, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\right)\right)\Bigg)\Bigg)\Bigg) \Big/$$

$$\Bigg(b \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\right) \text{Tan}[e+f x]^2\right)^2 \left(-b^2+a^2 \left(1+\text{Tan}[e+f x]^2\right)\right) +$$

$$\Bigg(3 a^3 \left(a^2-b^2\right) B\, \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, \frac{a^2 \text{Tan}[e+f x]^2}{-a^2+b^2}\right] \left(1+\text{Tan}[e+f x]^2\right)^{\frac{1}{2}-\frac{m}{2}}$$

$$\Bigg(2 \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\right) \text{Sec}[e+f x]^2 \text{Tan}[e+f x] -$$

$$3 \left(a^2-b^2\right) \left(-\frac{1}{3} (-1+m) \text{AppellF1}\left[\frac{3}{2}, 1+\frac{1}{2} (-1+m), 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{1}{3 \left(a^2-b^2\right)} 2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\right) +$$

$$\text{Tan}[e+f x]^2 \left(2 a^2 \left(-\frac{3}{5} (-1+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{1}{2} (-1+m), 2, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{1}{5 \left(a^2-b^2\right)} 12 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{1}{2} (-1+m), 3, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\right) + \left(a^2-b^2\right) (-1+m) \left(-\frac{1}{5 \left(a^2-b^2\right)} 6 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{1+m}{2}, 2, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{3}{5} (1+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{1+m}{2}, 1, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\right)\right)\Bigg)\Bigg)\Bigg) \Big/$$

$$\Bigg(b^2 \Bigg(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[e+f x]^2\Bigg)^2 \left(-b^2+a^2 \left(1+\text{Tan}[e+f x]^2\right)\right)\Bigg) +$$

$$\Bigg(3 a A \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \left(1+\text{Tan}[e+f x]^2\right)^{-m/2}$$

$$\Bigg(2 \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg) \text{Sec}[e+f x]^2 \text{Tan}[e+f x] -$$

$$3 \left(a^2-b^2\right) \Bigg(-\frac{1}{3} m \text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]}{3 \left(a^2-b^2\right)}\Bigg) +$$

$$\text{Tan}[e+f x]^2 \Bigg(2 a^2 \Bigg(-\frac{3}{5} m \text{AppellF1}\left[\frac{5}{2}, 1+\frac{m}{2}, 2, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{1}{5 \left(a^2-b^2\right)} 12 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{m}{2}, 3, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\Bigg) +$$

$$\left(a^2-b^2\right) m \Bigg(-\frac{1}{5 \left(a^2-b^2\right)} 6 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{2+m}{2}, 2, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x] - \frac{3}{5} (2+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{2+m}{2}, 1, \frac{7}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] \text{Sec}[e+f x]^2 \text{Tan}[e+f x]\Bigg)\Bigg)\Bigg)\Bigg) \Bigg/$$

$$\Bigg(\Bigg(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[e+f x]^2, -\frac{a^2 \text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[e+f x]^2\Bigg)^2$$

$$\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Bigg)-\Bigg(3 a^2\left(a^2-b^2\right) B\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]$$

$$\left(1+\text{Tan}[e+f x]^2\right)^{-m/2}\Bigg(2\Bigg(2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right) m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg)\,\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-$$

$$3\left(a^2-b^2\right)\Bigg(-\frac{1}{3} m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-$$

$$\frac{2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]}{3\left(a^2-b^2\right)}\Bigg)+$$

$$\text{Tan}[e+f x]^2\Bigg(2 a^2\Bigg(-\frac{3}{5} m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-$$

$$\frac{1}{5\left(a^2-b^2\right)}12 a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\Bigg)+$$

$$\left(a^2-b^2\right) m\Bigg(-\frac{1}{5\left(a^2-b^2\right)}6 a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-$$

$$\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(b\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\Bigg(2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},\right.$$

$$\left.-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right) m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},\right.$$

$$\left.-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[e+f x]^2\Bigg)^2\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Bigg)\Bigg)\Bigg)\Bigg)$$

- **Problem 459: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d x])\,(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^{7/2}\,dx$$

Optimal (type 4, 172 leaves, 9 steps):

$$-\frac{2a(3A+5B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{5d}+\frac{2a(A+B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{3d}+$$
$$\frac{2a(3A+5B)\sqrt{\text{Sec}[c+dx]}\ \text{Sin}[c+dx]}{5d}+\frac{2a(A+B)\text{Sec}[c+dx]^{3/2}\text{Sin}[c+dx]}{3d}+\frac{2aA\,\text{Sec}[c+dx]^{5/2}\text{Sin}[c+dx]}{5d}$$

Result (type 5, 381 leaves):

$$\frac{1}{30d}a(1+\text{Cos}[c+dx])\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2$$
$$\left(-9\sqrt{2}\,A\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\ \text{Csc}[c]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)-\right.$$
$$15\sqrt{2}\,B\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\ \text{Csc}[c]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)+$$
$$10A\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}+10B\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}+$$
$$\left.2\sqrt{\text{Sec}[c+dx]}\ (3(3A+5B)\text{Cos}[dx]\,\text{Csc}[c]+(5(A+B)+3A\,\text{Sec}[c+dx])\,\text{Tan}[c+dx])\right)$$

- **Problem 460: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+dx])\,(A+B\,\text{Cos}[c+dx])\,\text{Sec}[c+dx]^{5/2}\,dx$$

Optimal (type 4, 135 leaves, 8 steps):

$$-\frac{2a(A+B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{d}+$$
$$\frac{2a(A+3B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{3d}+\frac{2a(A+B)\sqrt{\text{Sec}[c+dx]}\ \text{Sin}[c+dx]}{d}+\frac{2aA\,\text{Sec}[c+dx]^{3/2}\text{Sin}[c+dx]}{3d}$$

Result (type 5, 227 leaves):

$$\frac{1}{3d\left(1+e^{2i(c+dx)}\right)}a\,e^{-i(c+dx)}(1+\text{Cos}[c+dx])\left((A+3B)\,e^{i(c+dx)}\left(1+e^{2i(c+dx)}\right)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]-\right.$$
$$\left.i\left(-3A-3B-A\,e^{i(c+dx)}-3A\,e^{2i(c+dx)}-3B\,e^{2i(c+dx)}+A\,e^{3i(c+dx)}+3(A+B)\left(1+e^{2i(c+dx)}\right)^{3/2}\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)\right)$$
$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\sqrt{\text{Sec}[c+dx]}$$

## Problem 461: Result unnecessarily involves higher level functions.

$$\int (a + a \operatorname{Cos}[c + d x]) (A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^{3/2} \, dx$$

Optimal (type 4, 106 leaves, 7 steps):

$$-\frac{2 a (A - B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{d} + \frac{2 a (A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{d} + \frac{2 a A \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{d}$$

Result (type 5, 124 leaves):

$$\frac{1}{d} 2 a \left( (A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] - \frac{1}{2} i e^{-i (c+d x)} \left(-2 A + B + B e^{2 i (c+d x)} + 2 (A - B) \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right)\right) \sqrt{\operatorname{Sec}[c + d x]}$$

## Problem 462: Result unnecessarily involves higher level functions.

$$\int (a + a \operatorname{Cos}[c + d x]) (A + B \operatorname{Cos}[c + d x]) \sqrt{\operatorname{Sec}[c + d x]} \, dx$$

Optimal (type 4, 110 leaves, 7 steps):

$$\frac{2 a (A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{d} + \frac{2 a (3 A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{3 d} + \frac{2 a B \operatorname{Sin}[c + d x]}{3 d \sqrt{\operatorname{Sec}[c + d x]}}$$

Result (type 5, 163 leaves):

$$\frac{1}{3 d} a e^{-i (2 c+d x)} \sqrt{\operatorname{Sec}[c + d x]} \left(2 (3 A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] + 6 i (A + B) e^{-i (c+d x)} \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right] + 2 \operatorname{Cos}[c + d x] (-3 i (A + B) + B \operatorname{Sin}[c + d x])\right) (\operatorname{Cos}[2 c + d x] + i \operatorname{Sin}[2 c + d x])$$

## Problem 463: Result unnecessarily involves higher level functions.

$$\int \frac{(a + a \operatorname{Cos}[c + d x]) (A + B \operatorname{Cos}[c + d x])}{\sqrt{\operatorname{Sec}[c + d x]}} \, dx$$

Optimal (type 4, 141 leaves, 8 steps):

$$\frac{2\,a\,(5\,A+3\,B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+$$

$$\frac{2\,a\,(A+B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a\,B\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,a\,(A+B)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 149 leaves) :

$$\frac{1}{30\,d}a\,\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(20\,(A+B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]+12\,i\,(5\,A+3\,B)\,e^{-i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+\right.$$
$$\left.2\,\text{Cos}[c+d\,x]\,(-6\,i\,(5\,A+3\,B)+10\,(A+B)\,\text{Sin}[c+d\,x]+3\,B\,\text{Sin}[2\,(c+d\,x)])\right)$$

## Problem 464: Result unnecessarily involves higher level functions.

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,(A+B\,\text{Cos}[c+d\,x])}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 172 leaves, 9 steps) :

$$\frac{6\,a\,(A+B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+$$

$$\frac{2\,a\,(7\,A+5\,B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a\,B\,\text{Sin}[c+d\,x]}{7\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{2\,a\,(A+B)\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,a\,(7\,A+5\,B)\,\text{Sin}[c+d\,x]}{21\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 162 leaves) :

$$\frac{1}{420\,d}a\,\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(40\,(7\,A+5\,B)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]+504\,i\,(A+B)\,e^{-i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+\right.$$
$$\left.2\,\text{Cos}[c+d\,x]\,(-252\,i\,(A+B)+5\,(28\,A+23\,B)\,\text{Sin}[c+d\,x]+42\,(A+B)\,\text{Sin}[2\,(c+d\,x)]+15\,B\,\text{Sin}[3\,(c+d\,x)])\right)$$

## Problem 465: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 199 leaves, 9 steps) :

$$-\frac{4 a^2 (4 A+5 B) \sqrt{\text{Cos}[c+d x]} \text{ EllipticE}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{5 d}+\frac{4 a^2 (A+2 B) \sqrt{\text{Cos}[c+d x]} \text{ EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{3 d}+\frac{4 a^2 (4 A+5 B) \sqrt{\text{Sec}[c+d x]} \text{ Sin}[c+d x]}{5 d}+\frac{2 a^2 (7 A+5 B) \text{ Sec}[c+d x]^{3/2} \text{ Sin}[c+d x]}{15 d}+\frac{2 A \text{ Sec}[c+d x]^{3/2} \left(a^2+a^2 \text{ Sec}[c+d x]\right) \text{ Sin}[c+d x]}{5 d}$$

Result (type 5, 386 leaves):

$$\frac{1}{30 d} a^2 (1+\text{Cos}[c+d x])^2 \text{ Sec}\left[\frac{1}{2} (c+d x)\right]^4 \left(-12 \sqrt{2} A e^{-i (2 c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \text{ Csc}[c] \left(1+e^{2 i (c+d x)}+\left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{ Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]\right)-15 \sqrt{2} B e^{-i (2 c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \text{ Csc}[c] \left(1+e^{2 i (c+d x)}+\left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{ Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]\right)+10 A \sqrt{\text{Cos}[c+d x]} \text{ EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}+20 B \sqrt{\text{Cos}[c+d x]} \text{ EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}+\sqrt{\text{Sec}[c+d x]} (6 (4 A+5 B) \text{ Cos}[d x] \text{ Csc}[c]+(5 (2 A+B)+3 A \text{ Sec}[c+d x]) \text{ Tan}[c+d x])\right)$$

## Problem 466: Result unnecessarily involves higher level functions.

$$\int (a+a \text{ Cos}[c+d x])^2 (A+B \text{ Cos}[c+d x]) \text{ Sec}[c+d x]^{5/2} \, dx$$

Optimal (type 4, 160 leaves, 8 steps):

$$-\frac{4 a^2 A \sqrt{\text{Cos}[c+d x]} \text{ EllipticE}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{d}+\frac{4 a^2 (2 A+3 B) \sqrt{\text{Cos}[c+d x]} \text{ EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{3 d}+\frac{2 a^2 (5 A+3 B) \sqrt{\text{Sec}[c+d x]} \text{ Sin}[c+d x]}{3 d}+\frac{2 A \sqrt{\text{Sec}[c+d x]} \left(a^2+a^2 \text{ Sec}[c+d x]\right) \text{ Sin}[c+d x]}{3 d}$$

Result (type 5, 188 leaves):

$$-\frac{1}{3 d} i a^2 \text{ Sec}[c+d x]^{3/2} \left(-6 A-6 A \text{ Cos}[2 (c+d x)]+6 A e^{-2 i (c+d x)} \left(1+e^{2 i (c+d x)}\right)^{3/2} \text{ Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+2 (2 A+3 B) e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)^{3/2} \text{ Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2 i (c+d x)}\right]+2 i A \text{ Sin}[c+d x]+6 i A \text{ Sin}[2 (c+d x)]+3 i B \text{ Sin}[2 (c+d x)]\right)$$

## Problem 467: Result unnecessarily involves higher level functions.

$$\int (a + a \operatorname{Cos}[c + d x])^2 (A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^{3/2} \, dx$$

Optimal (type 4, 160 leaves, 8 steps):

$$\frac{4 a^2 B \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{d} + \frac{4 a^2 (3 A + 2 B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{3 d} + \frac{2 a^2 (3 A - B) \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{3 d} + \frac{2 B \left(a^2 + a^2 \operatorname{Sec}[c + d x]\right) \operatorname{Sin}[c + d x]}{3 d \sqrt{\operatorname{Sec}[c + d x]}}$$

Result (type 5, 152 leaves):

$$\left(2 a^2 \left(12 i B \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right] - 4 i (3 A + 2 B) e^{i (c+d x)} \operatorname{Hypergeometric2F1}\left[\frac{1}{4}, \frac{1}{2}, \frac{5}{4}, -e^{2 i (c+d x)}\right] + \sqrt{1 + e^{2 i (c+d x)}} (-6 i B + B \operatorname{Sin}[c + d x] + 3 A \operatorname{Tan}[c + d x])\right)\right) \Big/ \left(3 d \sqrt{1 + e^{2 i (c+d x)}} \sqrt{\operatorname{Sec}[c + d x]}\right)$$

## Problem 468: Result unnecessarily involves higher level functions.

$$\int (a + a \operatorname{Cos}[c + d x])^2 (A + B \operatorname{Cos}[c + d x]) \sqrt{\operatorname{Sec}[c + d x]} \, dx$$

Optimal (type 4, 166 leaves, 8 steps):

$$\frac{4 a^2 (5 A + 4 B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{5 d} + \frac{4 a^2 (2 A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{3 d} + \frac{2 a^2 (5 A + 7 B) \operatorname{Sin}[c + d x]}{15 d \sqrt{\operatorname{Sec}[c + d x]}} + \frac{2 B \left(a^2 + a^2 \operatorname{Sec}[c + d x]\right) \operatorname{Sin}[c + d x]}{5 d \operatorname{Sec}[c + d x]^{3/2}}$$

Result (type 5, 155 leaves):

$$\frac{1}{30 d} a^2 \sqrt{\operatorname{Sec}[c + d x]} \left(40 (2 A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] + 24 i (5 A + 4 B) e^{-i (c+d x)} \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right] + 2 \operatorname{Cos}[c + d x] (-12 i (5 A + 4 B) + 10 (A + 2 B) \operatorname{Sin}[c + d x] + 3 B \operatorname{Sin}[2 (c + d x)])\right)$$

## Problem 469: Result unnecessarily involves higher level functions.

$$\int \frac{(a + a \operatorname{Cos}[c + d x])^2 (A + B \operatorname{Cos}[c + d x])}{\sqrt{\operatorname{Sec}[c + d x]}} \, dx$$

Optimal (type 4, 201 leaves, 9 steps):

$$\frac{4\,a^2\,(4\,A+3\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{4\,a^2\,(7\,A+6\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+$$
$$\frac{2\,a^2\,(7\,A+9\,B)\,\text{Sin}[c+d\,x]}{35\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{4\,a^2\,(7\,A+6\,B)\,\text{Sin}[c+d\,x]}{21\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,B\,\left(a^2+a^2\,\text{Sec}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{7\,d\,\text{Sec}[c+d\,x]^{5/2}}$$

Result (type 5, 208 leaves) :

$$\frac{1}{420\,d}\,a^2\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(80\,(7\,A+6\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]+\right.$$
$$336\,i\,(4\,A+3\,B)\,e^{-i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+2\,\text{Cos}[c+d\,x]$$
$$\left.(-168\,i\,(4\,A+3\,B)+5\,(56\,A+51\,B)\,\text{Sin}[c+d\,x]+42\,(A+2\,B)\,\text{Sin}[2\,(c+d\,x)]+15\,B\,\text{Sin}[3\,(c+d\,x)])\right)\,(\text{Cos}[2\,c+d\,x]+i\,\text{Sin}[2\,c+d\,x])$$

- **Problem 470: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^3\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 244 leaves, 10 steps) :

$$-\frac{4\,a^3\,(7\,A+9\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+$$
$$\frac{4\,a^3\,(13\,A+21\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+$$
$$\frac{4\,a^3\,(7\,A+9\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{4\,a^3\,(41\,A+42\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,d}+$$
$$\frac{2\,a\,A\,\text{Sec}[c+d\,x]^{3/2}\,(a+a\,\text{Sec}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,(11\,A+7\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{35\,d}$$

Result (type 5, 605 leaves) :

$$-\frac{1}{10\sqrt{2}\,d}7\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6-\frac{1}{10\sqrt{2}\,d}9\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$

$$(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+$$

$$\frac{13\,A\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{42\,d}+$$

$$\frac{B\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{2\,d}+(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(\frac{(7\,A+9\,B)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}[c]}{10\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Sin}[d\,x]}{28\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(5\,A\,\mathrm{Sin}[c]+21\,A\,\mathrm{Sin}[d\,x]+7\,B\,\mathrm{Sin}[d\,x])}{140\,d}+\right.$$

$$\left.\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(63\,A\,\mathrm{Sin}[c]+21\,B\,\mathrm{Sin}[c]+130\,A\,\mathrm{Sin}[d\,x]+105\,B\,\mathrm{Sin}[d\,x])}{420\,d}+\frac{(26\,A+21\,B)\,\mathrm{Tan}[c]}{84\,d}\right)$$

- **Problem 471: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^3\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 211 leaves, 9 steps):

$$-\frac{4\,a^3\,(9\,A+5\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{5\,d}+$$

$$\frac{4\,a^3\,(3\,A+5\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,d}+\frac{4\,a^3\,(21\,A+20\,B)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d}+$$

$$\frac{2\,a\,A\sqrt{\mathrm{Sec}[c+d\,x]}\,(a+a\,\mathrm{Sec}[c+d\,x])^2\,\mathrm{Sin}[c+d\,x]}{5\,d}+\frac{2\,(9\,A+5\,B)\sqrt{\mathrm{Sec}[c+d\,x]}\left(a^3+a^3\,\mathrm{Sec}[c+d\,x]\right)\mathrm{Sin}[c+d\,x]}{15\,d}$$

Result (type 5, 582 leaves):

$$-\frac{1}{10\sqrt{2}\,d}9\,A\,e^{-i\,(2c+d x)}\sqrt{\frac{e^{i\,(c+d x)}}{1+e^{2i\,(c+d x)}}}\,(a+a\,\mathrm{Cos}[c+d x])^3\,\mathrm{Csc}[c]\left(1+e^{2i\,(c+d x)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i\,(c+d x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i\,(c+d x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6-\frac{1}{2\sqrt{2}\,d}$$

$$B\,e^{-i\,(2c+d x)}\sqrt{\frac{e^{i\,(c+d x)}}{1+e^{2i\,(c+d x)}}}\,(a+a\,\mathrm{Cos}[c+d x])^3\,\mathrm{Csc}[c]\left(1+e^{2i\,(c+d x)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i\,(c+d x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i\,(c+d x)}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6+\frac{A\sqrt{\mathrm{Cos}[c+d x]}\,(a+a\,\mathrm{Cos}[c+d x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d x]}}{2d}+$$

$$\frac{5B\sqrt{\mathrm{Cos}[c+d x]}\,(a+a\,\mathrm{Cos}[c+d x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d x]}}{6d}+$$

$$(a+a\,\mathrm{Cos}[c+d x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d x]}\left(-\frac{(-36A-25B+5B\,\mathrm{Cos}[2c])\,\mathrm{Cos}[d x]\,\mathrm{Csc}[c]}{40d}+\frac{B\,\mathrm{Cos}[c]\,\mathrm{Sin}[d x]}{4d}+\right.$$

$$\left.\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d x]^2\,\mathrm{Sin}[d x]}{20d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d x]\,(3A\,\mathrm{Sin}[c]+15A\,\mathrm{Sin}[d x]+5B\,\mathrm{Sin}[d x])}{60d}+\frac{(3A+B)\,\mathrm{Tan}[c]}{12d}\right)$$

- **Problem 472: Result unnecessarily involves higher level functions.**

$$\int (a+a\,\mathrm{Cos}[c+d x])^3\,(A+B\,\mathrm{Cos}[c+d x])\,\mathrm{Sec}[c+d x]^{5/2}\,dx$$

Optimal (type 4, 199 leaves, 9 steps):

$$-\frac{4a^3(A-B)\sqrt{\mathrm{Cos}[c+d x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\mathrm{Sec}[c+d x]}}{d}+\frac{20a^3(A+B)\sqrt{\mathrm{Cos}[c+d x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\mathrm{Sec}[c+d x]}}{3d}+$$

$$\frac{4a^3(4A+B)\sqrt{\mathrm{Sec}[c+d x]}\,\mathrm{Sin}[c+d x]}{3d}+\frac{2aB\,(a+a\,\mathrm{Sec}[c+d x])^2\,\mathrm{Sin}[c+d x]}{3d\sqrt{\mathrm{Sec}[c+d x]}}+\frac{2(A-B)\sqrt{\mathrm{Sec}[c+d x]}\left(a^3+a^3\,\mathrm{Sec}[c+d x]\right)\mathrm{Sin}[c+d x]}{3d}$$

Result (type 5, 192 leaves):

$$\frac{1}{6d}a^3\,\mathrm{Sec}[c+d x]^{3/2}\left(12iA-12iB+12iA\,\mathrm{Cos}[2(c+d x)]-12iB\,\mathrm{Cos}[2(c+d x)]+\right.$$

$$40(A+B)\,\mathrm{Cos}[c+d x]^{3/2}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d x),2\right]-12i(A-B)\,e^{-2i\,(c+d x)}\left(1+e^{2i\,(c+d x)}\right)^{3/2}\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i\,(c+d x)}\right]+$$

$$\left.4A\,\mathrm{Sin}[c+d x]+B\,\mathrm{Sin}[c+d x]+18A\,\mathrm{Sin}[2(c+d x)]+6B\,\mathrm{Sin}[2(c+d x)]+B\,\mathrm{Sin}[3(c+d x)]\right)$$

- **Problem 473: Result unnecessarily involves higher level functions.**

$$\int (a+a\,\mathrm{Cos}[c+d x])^3\,(A+B\,\mathrm{Cos}[c+d x])\,\mathrm{Sec}[c+d x]^{3/2}\,dx$$

Optimal (type 4, 211 leaves, 9 steps):

$$\frac{4 a^3 (5 A+9 B) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{5 d}+\frac{4 a^3 (5 A+3 B) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{3 d}+$$
$$\frac{4 a^3 (5 A-6 B) \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{15 d}+\frac{2 a B (a+a \text{Sec}[c+d x])^2 \text{Sin}[c+d x]}{5 d \text{Sec}[c+d x]^{3/2}}+\frac{2 (5 A+9 B) \left(a^3+a^3 \text{Sec}[c+d x]\right) \text{Sin}[c+d x]}{15 d \sqrt{\text{Sec}[c+d x]}}$$

Result (type 5, 220 leaves):

$$\frac{1}{30 d} a^3 e^{-i (2 c+d x)} \sqrt{\text{Sec}[c+d x]} \left(-120 i A \text{Cos}[c+d x]-216 i B \text{Cos}[c+d x]+40 (5 A+3 B) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]+\right.$$
$$24 i (5 A+9 B) e^{-i (c+d x)} \sqrt{1+e^{2 i (c+d x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+60 A \text{Sin}[c+d x]+$$
$$\left.3 B \text{Sin}[c+d x]+10 A \text{Sin}[2 (c+d x)]+30 B \text{Sin}[2 (c+d x)]+3 B \text{Sin}[3 (c+d x)]\right) (\text{Cos}[2 c+d x]+i \text{Sin}[2 c+d x])$$

- **Problem 474: Result unnecessarily involves higher level functions.**

$$\int (a+a \text{Cos}[c+d x])^3 (A+B \text{Cos}[c+d x]) \sqrt{\text{Sec}[c+d x]}\, dx$$

Optimal (type 4, 211 leaves, 9 steps):

$$\frac{4 a^3 (9 A+7 B) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{5 d}+$$
$$\frac{4 a^3 (21 A+13 B) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{21 d}+\frac{4 a^3 (42 A+41 B) \text{Sin}[c+d x]}{105 d \sqrt{\text{Sec}[c+d x]}}+$$
$$\frac{2 a B (a+a \text{Sec}[c+d x])^2 \text{Sin}[c+d x]}{7 d \text{Sec}[c+d x]^{5/2}}+\frac{2 (7 A+11 B) \left(a^3+a^3 \text{Sec}[c+d x]\right) \text{Sin}[c+d x]}{35 d \text{Sec}[c+d x]^{3/2}}$$

Result (type 5, 208 leaves):

$$\frac{1}{420 d} a^3 e^{-i (2 c+d x)} \sqrt{\text{Sec}[c+d x]} \left(80 (21 A+13 B) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]+\right.$$
$$336 i (9 A+7 B) e^{-i (c+d x)} \sqrt{1+e^{2 i (c+d x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+2 \text{Cos}[c+d x]$$
$$\left.(-168 i (9 A+7 B)+5 (84 A+107 B) \text{Sin}[c+d x]+42 (A+3 B) \text{Sin}[2 (c+d x)]+15 B \text{Sin}[3 (c+d x)])\right) (\text{Cos}[2 c+d x]+i \text{Sin}[2 c+d x])$$

- **Problem 475: Result unnecessarily involves higher level functions.**

$$\int \frac{(a+a \text{Cos}[c+d x])^3 (A+B \text{Cos}[c+d x])}{\sqrt{\text{Sec}[c+d x]}}\, dx$$

Optimal (type 4, 244 leaves, 10 steps):

$$\frac{4 a^3 (21 A+17 B) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{15 d}+\frac{4 a^3 (13 A+11 B) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{21 d}+\frac{4 a^3 (24 A+23 B) \text{Sin}[c+d x]}{105 d\, \text{Sec}[c+d x]^{3/2}}+\frac{4 a^3 (13 A+11 B) \text{Sin}[c+d x]}{21 d \sqrt{\text{Sec}[c+d x]}}+\frac{2 a B (a+a \text{Sec}[c+d x])^2 \text{Sin}[c+d x]}{9 d\, \text{Sec}[c+d x]^{7/2}}+\frac{2 (9 A+13 B) \left(a^3+a^3 \text{Sec}[c+d x]\right) \text{Sin}[c+d x]}{63 d\, \text{Sec}[c+d x]^{5/2}}$$

Result (type 5, 197 leaves):

$$\frac{1}{2520 d} a^3 \sqrt{\text{Sec}[c+d x]} \left(480 (13 A+11 B) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]+672 i (21 A+17 B) e^{-i (c+d x)} \sqrt{1+e^{2 i (c+d x)}}\, \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i (c+d x)}\right]+2 \text{Cos}[c+d x] \left(-7056 i A-5712 i B+30 (107 A+97 B) \text{Sin}[c+d x]+14 (54 A+73 B) \text{Sin}[2 (c+d x)]+90 A \text{Sin}[3 (c+d x)]+270 B \text{Sin}[3 (c+d x)]+35 B \text{Sin}[4 (c+d x)]\right)\right)$$

- **Problem 476: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(A+B \text{Cos}[c+d x]) \text{Sec}[c+d x]^{5/2}}{a+a \text{Cos}[c+d x]}\, dx$$

Optimal (type 4, 193 leaves, 9 steps):

$$\frac{3 (A-B) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{a d}+\frac{(5 A-3 B) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{3 a d}-\frac{3 (A-B) \sqrt{\text{Sec}[c+d x]}\, \text{Sin}[c+d x]}{a d}+\frac{(5 A-3 B) \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{3 a d}-\frac{(A-B) \text{Sec}[c+d x]^{5/2} \text{Sin}[c+d x]}{d (a+a \text{Sec}[c+d x])}$$

Result (type 5, 631 leaves):

$$\frac{1}{\sqrt{2}\, d\,(a+a\,\mathrm{Cos}[c+d\,x])} 3\,A\,e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]-\frac{1}{\sqrt{2}\, d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

$$3\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{5\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}-$$

$$\frac{B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}+\frac{1}{a+a\,\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{3\,(A-B)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{d}+\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{2\,(2\,A+5\,A\,\mathrm{Cos}[c]-3\,B\,\mathrm{Cos}[c])\,\mathrm{Sec}[c]\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 477: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{3/2}}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 159 leaves, 8 steps):

$$-\frac{(3\,A-B)\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d}-$$

$$\frac{(A-B)\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d}+\frac{(3\,A-B)\sqrt{\mathrm{Sec}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{a\,d}-\frac{(A-B)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Sec}[c+d\,x])}$$

Result (type 5, 595 leaves):

$$-\frac{1}{\sqrt{2}\, d\, (a+a\,\mathrm{Cos}[c+d\,x])} 3\,A\, e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\ \mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right] \left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right) \mathrm{Sec}\left[\frac{c}{2}\right] + \frac{1}{\sqrt{2}\, d\, (a+a\,\mathrm{Cos}[c+d\,x])} B\, e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\ \mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right] \left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right) \mathrm{Sec}\left[\frac{c}{2}\right] - \frac{A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \sqrt{\mathrm{Sec}[c+d\,x]}\ \mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])} + \frac{B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \sqrt{\mathrm{Sec}[c+d\,x]}\ \mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])} + \frac{1}{a+a\,\mathrm{Cos}[c+d\,x]} \mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \sqrt{\mathrm{Sec}[c+d\,x]} \left(\frac{(3\,A-B)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{d} - \frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d} - \frac{2\,(A-B)\,\mathrm{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

- **Problem 478: Result unnecessarily involves higher level functions.**

$$\int \frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\sqrt{\mathrm{Sec}[c+d\,x]}}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 123 leaves, 7 steps):

$$\frac{(A-B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d} + \frac{(A+B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d} - \frac{(A-B)\,\sqrt{\mathrm{Sec}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Sec}[c+d\,x])}$$

Result (type 5, 185 leaves):

$$\frac{1}{2\,a\,(1+\mathrm{Cos}[c+d\,x])}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2 \left(\frac{4\,(A+B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{d} - 1\Big/\left(d\left(1+e^{i\,(c+d\,x)}\right)\right) 4\,i\,(A-B)\,e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}-\left(1+e^{i\,(c+d\,x)}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\sqrt{\mathrm{Sec}[c+d\,x]}\right)$$

- **Problem 479: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 125 leaves, 7 steps):

$$-\frac{(A-3B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{a\,d}+\frac{(A-B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{a\,d}+\frac{(A-B)\sqrt{\text{Sec}[c+dx]}\ \text{Sin}[c+dx]}{d\,(a+a\,\text{Sec}[c+dx])}$$

Result (type 5, 402 leaves):

$$\frac{1}{2\,a\,d\,(1+\text{Cos}[c+dx])}\text{Cos}\left[\frac{1}{2}(c+dx)\right]^2\left(-2\sqrt{2}\,A\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\ \text{Csc}[c]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)+\right.$$
$$6\sqrt{2}\,B\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\ \text{Csc}[c]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)+$$
$$\frac{2\left((A-2B)\,\text{Cos}\left[\frac{1}{2}(c-dx)\right]-B\,\text{Cos}\left[\frac{1}{2}(3c+dx)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{\text{Sec}[c+dx]}}+$$
$$\left.4\,A\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}-4\,B\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}\right)$$

- **Problem 480: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+dx]}{(a+a\,\text{Cos}[c+dx])\,\text{Sec}[c+dx]^{3/2}}\,dx$$

Optimal (type 4, 163 leaves, 8 steps):

$$\frac{3(A-B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{a\,d}-\frac{(3A-5B)\sqrt{\text{Cos}[c+dx]}\ \text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{3\,a\,d}-\frac{(3A-5B)\,\text{Sin}[c+dx]}{3\,a\,d\sqrt{\text{Sec}[c+dx]}}+\frac{(A-B)\,\text{Sin}[c+dx]}{d\sqrt{\text{Sec}[c+dx]}\,(a+a\,\text{Sec}[c+dx])}$$

Result (type 5, 654 leaves):

$$\frac{1}{\sqrt{2}\, d\, (a + a\,\text{Cos}[c + d\,x])} 3\,A\, e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1 + e^{2\,i\,(c+d\,x)}}}\ \text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^2 \text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1 + e^{2\,i\,(c+d\,x)} + \left(-1 + e^{2\,i\,c}\right) \sqrt{1 + e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\,i\,(c+d\,x)}\right]\right) \text{Sec}\left[\frac{c}{2}\right] - \frac{1}{\sqrt{2}\, d\, (a + a\,\text{Cos}[c + d\,x])}$$
$$3\,B\, e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1 + e^{2\,i\,(c+d\,x)}}}\ \text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^2 \text{Csc}\left[\frac{c}{2}\right] \left(1 + e^{2\,i\,(c+d\,x)} + \left(-1 + e^{2\,i\,c}\right) \sqrt{1 + e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}\right] - \frac{A\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^2 \sqrt{\text{Cos}[c + d\,x]}\ \text{Csc}\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2}\,(c + d\,x), 2\right] \text{Sec}\left[\frac{c}{2}\right] \sqrt{\text{Sec}[c + d\,x]}\ \text{Sin}[c]}{d\,(a + a\,\text{Cos}[c + d\,x])} +$$
$$\frac{5\,B\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^2 \sqrt{\text{Cos}[c + d\,x]}\ \text{Csc}\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2}\,(c + d\,x), 2\right] \text{Sec}\left[\frac{c}{2}\right] \sqrt{\text{Sec}[c + d\,x]}\ \text{Sin}[c]}{3\,d\,(a + a\,\text{Cos}[c + d\,x])} + \frac{1}{a + a\,\text{Cos}[c + d\,x]}$$
$$\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^2 \sqrt{\text{Sec}[c + d\,x]} \left(-\frac{(A - B)\,(2 + \text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}\right]}{d} + \frac{2\,B\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d} + \right.$$
$$\left. \frac{2\,\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2} + \frac{d\,x}{2}\right] \left(A\,\text{Sin}\left[\frac{d\,x}{2}\right] - B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d} + \frac{4\,(A - B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d} + \frac{2\,B\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d} + \frac{2\,(A - B)\,\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

- **Problem 481: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + B\,\text{Cos}[c + d\,x]}{(a + a\,\text{Cos}[c + d\,x])\,\text{Sec}[c + d\,x]^{5/2}}\,dx$$

Optimal (type 4, 196 leaves, 9 steps):

$$-\frac{3\,(5\,A - 7\,B)\,\sqrt{\text{Cos}[c + d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c + d\,x), 2\right] \sqrt{\text{Sec}[c + d\,x]}}{5\,a\,d} + \frac{5\,(A - B)\,\sqrt{\text{Cos}[c + d\,x]}\ \text{EllipticF}\left[\frac{1}{2}\,(c + d\,x), 2\right] \sqrt{\text{Sec}[c + d\,x]}}{3\,a\,d} -$$
$$\frac{(5\,A - 7\,B)\,\text{Sin}[c + d\,x]}{5\,a\,d\,\text{Sec}[c + d\,x]^{3/2}} + \frac{5\,(A - B)\,\text{Sin}[c + d\,x]}{3\,a\,d\,\sqrt{\text{Sec}[c + d\,x]}} + \frac{(A - B)\,\text{Sin}[c + d\,x]}{d\,\text{Sec}[c + d\,x]^{3/2}\,(a + a\,\text{Sec}[c + d\,x])}$$

Result (type 5, 498 leaves):

$$\frac{1}{60\,a\,d\,(1+\text{Cos}[c+d\,x])}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2$$
$$\Bigg(-180\sqrt{2}\,A\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+$$
$$252\sqrt{2}\,B\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+$$
$$200\,A\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}-200\,B\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}+$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\Bigg(3\,(40\,A-51\,B+(20\,A-33\,B)\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]+$$
$$40\,(A-B)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]+12\,B\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]-120\,(A-B)\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]-$$
$$12\,(20\,A-33\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]+40\,(A-B)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]+12\,B\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]-120\,(A-B)\,\text{Tan}\left[\frac{c}{2}\right]\Bigg)\Bigg)$$

- **Problem 482: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 208 leaves, 9 steps):

$$-\frac{(4\,A-B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}-\frac{(5\,A-2\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}+$$
$$\frac{(4\,A-B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a^2\,d}-\frac{(5\,A-2\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Sec}[c+d\,x])}-\frac{(A-B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Sec}[c+d\,x])^2}$$

Result (type 5, 689 leaves):

$$-\frac{1}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}4\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{1}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$
$$\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\mathrm{Sec}\left[\frac{c}{2}\right]-\frac{10\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+$$
$$\frac{4\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{2\,(4\,A-B)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{d}-\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(5\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-2\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\right.$$
$$\left.\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{4\,(5\,A-2\,B)\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 483: Result unnecessarily involves higher level functions.**

$$\int\frac{(A+B\,\mathrm{Cos}[c+d\,x])\sqrt{\mathrm{Sec}[c+d\,x]}}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 161 leaves, 8 steps) :

$$\frac{A\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a^2\,d}+$$
$$\frac{(2\,A+B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,a^2\,d}-\frac{A\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{a^2\,d\,(1+\mathrm{Sec}[c+d\,x])}-\frac{(A-B)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^2}$$

Result (type 5, 263 leaves) :

$$\frac{1}{6 a^2 d (1+\cos[c+d x])^2} e^{-i (2 c+d x)} \cos\left[\frac{1}{2} (c+d x)\right] \sqrt{\sec[c+d x]} \left(3 i A e^{-2 i (c+d x)} \left(1+e^{i (c+d x)}\right)^3 \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right] + 8 (2 A+B) \cos\left[\frac{1}{2} (c+d x)\right]^3 \sqrt{\cos[c+d x]} \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \left(\cos\left[\frac{1}{2} (c+d x)\right] + i \sin\left[\frac{1}{2} (c+d x)\right]\right) - 2 i \cos[c+d x] (7 A-B+(5 A+B) \cos[c+d x] - i (A-B) \sin[c+d x])\right) \left(\cos\left[\frac{1}{2} (3 c+d x)\right] + i \sin\left[\frac{1}{2} (3 c+d x)\right]\right)$$

- **Problem 484: Result unnecessarily involves higher level functions.**

$$\int \frac{A+B \cos[c+d x]}{(a+a \cos[c+d x])^2 \sqrt{\sec[c+d x]}} \, dx$$

Optimal (type 4, 168 leaves, 8 steps):

$$-\frac{B \sqrt{\cos[c+d x]} \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\sec[c+d x]}}{a^2 d} + \frac{(A+2 B) \sqrt{\cos[c+d x]} \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\sec[c+d x]}}{3 a^2 d} + \frac{(A+2 B) \sqrt{\sec[c+d x]} \sin[c+d x]}{3 a^2 d (1+\sec[c+d x])} - \frac{(A-B) \sqrt{\sec[c+d x]} \sin[c+d x]}{3 d (a+a \sec[c+d x])^2}$$

Result (type 5, 264 leaves):

$$\frac{1}{6 a^2 d (1+\cos[c+d x])^2} e^{-i (2 c+d x)} \cos\left[\frac{1}{2} (c+d x)\right] \sqrt{\sec[c+d x]} \left(8 (A+2 B) \cos\left[\frac{1}{2} (c+d x)\right]^3 \sqrt{\cos[c+d x]} \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \left(\cos\left[\frac{1}{2} (c+d x)\right] + i \sin\left[\frac{1}{2} (c+d x)\right]\right) - i \left(3 B e^{-2 i (c+d x)} \left(1+e^{i (c+d x)}\right)^3 \sqrt{1+e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right] + 2 \cos[c+d x] (-A-5 B+(A-7 B) \cos[c+d x] + i (A-B) \sin[c+d x])\right)\right) \left(\cos\left[\frac{1}{2} (3 c+d x)\right] + i \sin\left[\frac{1}{2} (3 c+d x)\right]\right)$$

- **Problem 485: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+B \cos[c+d x]}{(a+a \cos[c+d x])^2 \sec[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 176 leaves, 8 steps):

$$-\frac{(A-4B)\sqrt{\text{Cos}[c+dx]}\,\text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{a^2 d}+\frac{(2A-5B)\sqrt{\text{Cos}[c+dx]}\,\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{3a^2 d}+\frac{(2A-5B)\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{3a^2 d(1+\text{Sec}[c+dx])}+\frac{(A-B)\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{3d(a+a\,\text{Sec}[c+dx])^2}$$

Result (type 5, 708 leaves) :

$$-\frac{1}{d(a+a\,\text{Cos}[c+dx])^2}\sqrt{2}\,A\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]+\frac{1}{d(a+a\,\text{Cos}[c+dx])^2}$$
$$4\sqrt{2}\,B\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}\right]+\frac{4A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\sqrt{\text{Cos}[c+dx]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c]}{3d(a+a\,\text{Cos}[c+dx])^2}-$$
$$\frac{10B\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\sqrt{\text{Cos}[c+dx]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c]}{3d(a+a\,\text{Cos}[c+dx])^2}+\frac{1}{(a+a\,\text{Cos}[c+dx])^2}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\sqrt{\text{Sec}[c+dx]}\left(-\frac{2(-A+3B+B\,\text{Cos}[2c])\,\text{Cos}[dx]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(4A\,\text{Sin}\left[\frac{dx}{2}\right]-7B\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{3d}+\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(A\,\text{Sin}\left[\frac{dx}{2}\right]-B\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{3d}+\frac{8B\,\text{Cos}[c]\,\text{Sin}[dx]}{d}-\frac{4(4A-7B)\,\text{Tan}\left[\frac{c}{2}\right]}{3d}+\frac{2(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3d}\right)$$

- **Problem 486: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+dx]}{(a+a\,\text{Cos}[c+dx])^2\,\text{Sec}[c+dx]^{5/2}}\,dx$$

Optimal (type 4, 206 leaves, 9 steps) :

$$\frac{(4A-7B)\sqrt{\text{Cos}[c+dx]}\,\text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{a^2 d}-\frac{5(A-2B)\sqrt{\text{Cos}[c+dx]}\,\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\text{Sec}[c+dx]}}{3a^2 d}-\frac{5(A-2B)\,\text{Sin}[c+dx]}{3a^2 d\sqrt{\text{Sec}[c+dx]}}+\frac{(4A-7B)\,\text{Sin}[c+dx]}{3a^2 d\sqrt{\text{Sec}[c+dx]}\,(1+\text{Sec}[c+dx])}+\frac{(A-B)\,\text{Sin}[c+dx]}{3d\sqrt{\text{Sec}[c+dx]}\,(a+a\,\text{Sec}[c+dx])^2}$$

Result (type 5, 753 leaves) :

$$\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}4\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]-\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

$$7\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\text{Sec}\left[\frac{c}{2}\right]-\frac{10\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+$$

$$\frac{20\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{2\,(3\,A-5\,B+A\,\text{Cos}[2\,c]-2\,B\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{d}+\frac{4\,B\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d}+\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(7\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-10\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+$$

$$\left.\frac{8\,(A-2\,B)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}+\frac{4\,B\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d}+\frac{4\,(7\,A-10\,B)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 487: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 261 leaves, 10 steps):

$$-\frac{(49\,A-9\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}-$$

$$\frac{(13\,A-3\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}+\frac{(49\,A-9\,B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,a^3\,d}-$$

$$\frac{(A-B)\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Sec}[c+d\,x])^3}-\frac{(8\,A-3\,B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Sec}[c+d\,x])^2}-\frac{(13\,A-3\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)}$$

Result (type 5, 778 leaves):

$$-\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}49\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$
$$9\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\mathrm{Sec}\left[\frac{c}{2}\right]-\frac{26\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$
$$\frac{2\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{2\,(49\,A-9\,B)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{5\,d}-\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(8\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-3\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}-\right.$$
$$\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(13\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-3\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-$$
$$\left.\frac{4\,(13\,A-3\,B)\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{4\,(8\,A-3\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 488: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\mathrm{Cos}[c+d\,x])\sqrt{\mathrm{Sec}[c+d\,x]}}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 222 leaves, 9 steps) :

$$\frac{(9\,A+B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{(3\,A+B)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{6\,a^3\,d}-$$
$$\frac{(A-B)\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^3}-\frac{(6\,A-B)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Sec}[c+d\,x])^2}-\frac{(9\,A+B)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\mathrm{Sec}[c+d\,x]\right)}$$

Result (type 5, 773 leaves) :

$$\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}9\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]+\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$
$$\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}\right]+\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$
$$\frac{2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$
$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(-\frac{2\,(9\,A+B)\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{5\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$
$$\left.\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+2\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{4\,(3\,A+B)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{4\,(3\,A+2\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 489: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^3\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 216 leaves, 9 steps):

$$\frac{(A-B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{(A+B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}-$$
$$\frac{(A-B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Sec}[c+d\,x])^3}-\frac{(4\,A+B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Sec}[c+d\,x])^2}+\frac{(A+B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)}$$

Result (type 5, 772 leaves):

$$\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]-\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$
$$\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}\right]+\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$
$$\frac{2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$
$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(-\frac{2\,(A-B)\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(2\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-7\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$
$$\left.\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{4\,(A+B)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{4\,(2\,A-7\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 490: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 222 leaves, 9 steps):

$$-\frac{(A+9\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{(A+3\,B)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}-$$
$$\frac{(A-B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Sec}[c+d\,x])^3}+\frac{(2\,A+3\,B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Sec}[c+d\,x])^2}+\frac{(A+3\,B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)}$$

Result (type 5, 773 leaves):

$$-\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]-\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

$$9\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\text{Sec}\left[\frac{c}{2}\right]+\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$

$$\frac{2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$

$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(\frac{2\,(A+9\,B)\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{5\,d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(7\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-12\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,(A-9\,B)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{4\,(7\,A-12\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 491: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 228 leaves, 9 steps):

$$-\frac{(9\,A-49\,B)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{(3\,A-13\,B)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}+$$

$$\frac{(A-B)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Sec}[c+d\,x])^3}+\frac{(3\,A-8\,B)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Sec}[c+d\,x])^2}+\frac{(3\,A-13\,B)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Sec}[c+d\,x]\right)}$$

Result (type 5, 797 leaves):

$$-\frac{1}{5 d (a + a \text{Cos}[c + d x])^3} 9 \sqrt{2} A e^{-i (2 c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1 + e^{2 i (c+d x)}}} \text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6$$

$$\text{Csc}\left[\frac{c}{2}\right] \left(1 + e^{2 i (c+d x)} + \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right) \text{Sec}\left[\frac{c}{2}\right] +$$

$$\frac{1}{5 d (a + a \text{Cos}[c + d x])^3} 49 \sqrt{2} B e^{-i (2 c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1 + e^{2 i (c+d x)}}} \text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right]$$

$$\left(1 + e^{2 i (c+d x)} + \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c+d x)}} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right) \text{Sec}\left[\frac{c}{2}\right] +$$

$$\frac{2 A \text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \sqrt{\text{Cos}[c + d x]} \text{Csc}\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \text{Sec}\left[\frac{c}{2}\right] \sqrt{\text{Sec}[c + d x]} \text{Sin}[c]}{d (a + a \text{Cos}[c + d x])^3} -$$

$$\frac{26 B \text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \sqrt{\text{Cos}[c + d x]} \text{Csc}\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \text{Sec}\left[\frac{c}{2}\right] \sqrt{\text{Sec}[c + d x]} \text{Sin}[c]}{3 d (a + a \text{Cos}[c + d x])^3} + \frac{1}{(a + a \text{Cos}[c + d x])^3}$$

$$\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \sqrt{\text{Sec}[c + d x]} \left(-\frac{2 (-9 A + 39 B + 10 B \text{Cos}[2 c]) \text{Cos}[d x] \text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}\right]}{5 d} - \frac{4 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right] \left(9 A \text{Sin}\left[\frac{d x}{2}\right] - 23 B \text{Sin}\left[\frac{d x}{2}\right]\right)}{3 d} +\right.$$

$$\frac{4 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \left(12 A \text{Sin}\left[\frac{d x}{2}\right] - 17 B \text{Sin}\left[\frac{d x}{2}\right]\right)}{15 d} - \frac{2 \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^5 \left(A \text{Sin}\left[\frac{d x}{2}\right] - B \text{Sin}\left[\frac{d x}{2}\right]\right)}{5 d} +$$

$$\left.\frac{16 B \text{Cos}[c] \text{Sin}[d x]}{d} - \frac{4 (9 A - 23 B) \text{Tan}\left[\frac{c}{2}\right]}{3 d} + \frac{4 (12 A - 17 B) \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2 \text{Tan}\left[\frac{c}{2}\right]}{15 d} - \frac{2 (A - B) \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \text{Tan}\left[\frac{c}{2}\right]}{5 d}\right)$$

- **Problem 492: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + B \text{Cos}[c + d x]}{(a + a \text{Cos}[c + d x])^3 \text{Sec}[c + d x]^{7/2}} \, dx$$

Optimal (type 4, 259 leaves, 10 steps):

$$\frac{7 (7 A - 17 B) \sqrt{\text{Cos}[c + d x]} \text{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\text{Sec}[c + d x]}}{10 a^3 d} -$$

$$\frac{(13 A - 33 B) \sqrt{\text{Cos}[c + d x]} \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\text{Sec}[c + d x]}}{6 a^3 d} - \frac{(13 A - 33 B) \text{Sin}[c + d x]}{6 a^3 d \sqrt{\text{Sec}[c + d x]}} +$$

$$\frac{(A - B) \text{Sin}[c + d x]}{5 d \sqrt{\text{Sec}[c + d x]} (a + a \text{Sec}[c + d x])^3} + \frac{(A - 2 B) \text{Sin}[c + d x]}{3 a d \sqrt{\text{Sec}[c + d x]} (a + a \text{Sec}[c + d x])^2} + \frac{7 (7 A - 17 B) \text{Sin}[c + d x]}{30 d \sqrt{\text{Sec}[c + d x]} \left(a^3 + a^3 \text{Sec}[c + d x]\right)}$$

Result (type 5, 842 leaves):

$$\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}49\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$
$$\mathrm{Csc}\Big[\frac{c}{2}\Big]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\Big]\right)\mathrm{Sec}\Big[\frac{c}{2}\Big]-$$
$$\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}119\sqrt{2}\,B\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\mathrm{Csc}\Big[\frac{c}{2}\Big]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\Big]\right)\mathrm{Sec}\Big[\frac{c}{2}\Big]-$$
$$\frac{26\,A\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\big[\frac{c}{2}\big]\,\mathrm{EllipticF}\big[\frac{1}{2}(c+d\,x),2\big]\,\mathrm{Sec}\big[\frac{c}{2}\big]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$
$$\frac{22\,B\,\mathrm{Cos}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\big[\frac{c}{2}\big]\,\mathrm{EllipticF}\big[\frac{1}{2}(c+d\,x),2\big]\,\mathrm{Sec}\big[\frac{c}{2}\big]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$
$$\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{2\,(39\,A-89\,B+10\,A\,\mathrm{Cos}[2\,c]-30\,B\,\mathrm{Cos}[2\,c])\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\big[\frac{c}{2}\big]\,\mathrm{Sec}\big[\frac{c}{2}\big]}{5\,d}+\right.$$
$$\frac{8\,B\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{3\,d}+\frac{4\,\mathrm{Sec}\big[\frac{c}{2}\big]\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]\left(23\,A\,\mathrm{Sin}\big[\frac{d\,x}{2}\big]-43\,B\,\mathrm{Sin}\big[\frac{d\,x}{2}\big]\right)}{3\,d}-\frac{4\,\mathrm{Sec}\big[\frac{c}{2}\big]\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3\left(17\,A\,\mathrm{Sin}\big[\frac{d\,x}{2}\big]-22\,B\,\mathrm{Sin}\big[\frac{d\,x}{2}\big]\right)}{15\,d}+$$
$$\frac{2\,\mathrm{Sec}\big[\frac{c}{2}\big]\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^5\left(A\,\mathrm{Sin}\big[\frac{d\,x}{2}\big]-B\,\mathrm{Sin}\big[\frac{d\,x}{2}\big]\right)}{5\,d}+\frac{16\,(A-3\,B)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}+\frac{8\,B\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{3\,d}+$$
$$\left.\frac{4\,(23\,A-43\,B)\,\mathrm{Tan}\big[\frac{c}{2}\big]}{3\,d}-\frac{4\,(17\,A-22\,B)\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^2\,\mathrm{Tan}\big[\frac{c}{2}\big]}{15\,d}+\frac{2\,(A-B)\,\mathrm{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^4\,\mathrm{Tan}\big[\frac{c}{2}\big]}{5\,d}\right)$$

- **Problem 497: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 96 leaves, 4 steps):

$$\frac{2\sqrt{a}\,B\,\mathrm{ArcSin}\Big[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\Big]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{d}+\frac{2\,a\,A\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 299 leaves):

$$\frac{1}{d\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}}\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]\sqrt{\text{Sec}[c+d x]}$$
$$\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)\left(i\,B\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\,\right]\text{Cos}[c+d x]-\right.$$
$$i\,B\,\text{Cos}[c+d x]\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+$$
$$\left.2\sqrt{2}\,A\left(\text{Cos}\left[\frac{d x}{2}\right]-i\,\text{Sin}\left[\frac{d x}{2}\right]\right)\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 498: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d x]}\,(A+B\,\text{Cos}[c+d x])\sqrt{\text{Sec}[c+d x]}\,dx$$

Optimal (type 3, 98 leaves, 4 steps):

$$\frac{\sqrt{a}\,(2 A+B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{d}+\frac{a\,B\,\text{Sin}[c+d x]}{d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 442 leaves):

$$\frac{1}{2\sqrt{2}\,d\sqrt{\text{Sec}[c+d x]}\,\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}}\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]$$
$$\left(-i\,(2 A+B)\,\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$i\,(2 A+B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\,\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$2\,A\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$B\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$\left.2\sqrt{2}\,B\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 499: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d x]}\,(A+B\,\text{Cos}[c+d x])}{\sqrt{\text{Sec}[c+d x]}}\,dx$$

Optimal (type 3, 151 leaves, 5 steps):

$$\frac{\sqrt{a}\,(4A+3B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{4 d}+$$

$$\frac{a B\,\text{Sin}[c+d x]}{2 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}}+\frac{a\,(4A+3B)\,\text{Sin}[c+d x]}{4 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 531 leaves) :

$$\frac{1}{8\sqrt{2}\,d\sqrt{\text{Sec}[c+d x]}\,\sqrt{\text{Cos}[c+d x]}\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]$$

$$\left(-i\,(4A+3B)\,\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$

$$i\,(4A+3B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$

$$4 A\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$

$$3 B\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$

$$8\sqrt{2}\,A\sqrt{\text{Cos}[c+d x]}\,(\text{Cos}[d x]+i\,\text{Sin}[d x])\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$\left.4\sqrt{2}\,B\sqrt{\text{Cos}[c+d x]}\,(\text{Cos}[d x]+i\,\text{Sin}[d x])\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+2\sqrt{2}\,B\sqrt{\text{Cos}[c+d x]}\,(\text{Cos}[d x]+i\,\text{Sin}[d x])\,\text{Sin}\left[\frac{3}{2}(c+d x)\right]\right)$$

- **Problem 500: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d x]}\,(A+B\,\text{Cos}[c+d x])}{\text{Sec}[c+d x]^{3/2}}\,dx$$

Optimal (type 3, 196 leaves, 6 steps) :

$$\frac{\sqrt{a}\,(6A+5B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{8 d}+$$

$$\frac{a B\,\text{Sin}[c+d x]}{3 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{5/2}}+\frac{a\,(6A+5B)\,\text{Sin}[c+d x]}{12 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}}+\frac{a\,(6A+5B)\,\text{Sin}[c+d x]}{8 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 615 leaves) :

$$\frac{1}{48\sqrt{2}\,d\sqrt{\text{Sec}[c+dx]}\,\sqrt{\text{Cos}[c+dx]\,(\text{Cos}[dx]+i\,\text{Sin}[dx])}}\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]$$
$$\left(-3\,i\,(6A+5B)\,\text{Cos}\left[\frac{dx}{2}\right]\text{Log}\left[2\left(e^{idx}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,(6A+5B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{dx}{2}\right]+i\,\text{Sin}\left[\frac{dx}{2}\right]\right)+$$
$$18\,A\,\text{Log}\left[2\left(e^{idx}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{dx}{2}\right]+$$
$$15\,B\,\text{Log}\left[2\left(e^{idx}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{dx}{2}\right]+$$
$$24\sqrt{2}\,A\sqrt{\text{Cos}[c+dx]\,(\text{Cos}[dx]+i\,\text{Sin}[dx])}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+$$
$$28\sqrt{2}\,B\sqrt{\text{Cos}[c+dx]\,(\text{Cos}[dx]+i\,\text{Sin}[dx])}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+12\sqrt{2}\,A\sqrt{\text{Cos}[c+dx]\,(\text{Cos}[dx]+i\,\text{Sin}[dx])}\,\text{Sin}\left[\frac{3}{2}(c+dx)\right]+$$
$$\left.6\sqrt{2}\,B\sqrt{\text{Cos}[c+dx]\,(\text{Cos}[dx]+i\,\text{Sin}[dx])}\,\text{Sin}\left[\frac{3}{2}(c+dx)\right]+4\sqrt{2}\,B\sqrt{\text{Cos}[c+dx]\,(\text{Cos}[dx]+i\,\text{Sin}[dx])}\,\text{Sin}\left[\frac{5}{2}(c+dx)\right]\right)$$

- **Problem 505: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+dx])^{3/2}\,(A+B\,\text{Cos}[c+dx])\,\text{Sec}[c+dx]^{5/2}\,dx$$

Optimal (type 3, 145 leaves, 5 steps):

$$\frac{2\,a^{3/2}\,B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{d}+$$
$$\frac{2\,a^2\,(4A+3B)\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{3\,d\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{2\,a\,A\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^{3/2}\,\text{Sin}[c+dx]}{3\,d}$$

Result (type 3, 774 leaves):

$$\frac{1}{12\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sqrt{\text{Sec}[c+d\,x]}$$
$$\Bigg(3\,B\,e^{-\frac{1}{2}\,i\,d\,x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\text{Cos}\left[\frac{c}{2}\right]^2\,\left(i\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)+$$
$$3\,B\,e^{-\frac{1}{2}\,i\,d\,x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]$$
$$\text{Sin}\left[\frac{c}{2}\right]^2\,\left(i\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-3\,i\,B\,e^{-\frac{1}{2}\,i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]^2$$
$$\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$3\,i\,B\,e^{-\frac{1}{2}\,i\,d\,x}\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{c}{2}\right]^2$$
$$\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)+20\,A\,\text{Cos}\left[\frac{c}{2}\right]\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$12\,B\,\text{Cos}\left[\frac{c}{2}\right]\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\text{Sin}\left[\frac{d\,x}{2}\right]+20\,\sqrt{2}\,A\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}+$$
$$12\,\sqrt{2}\,B\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}+4\,\sqrt{2}\,A\,\text{Sec}[c+d\,x]\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)$$

- **Problem 506: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 146 leaves, 5 steps):

$$\frac{a^{3/2}\,(2\,A+3\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}-$$
$$\frac{a^2\,(2\,A-B)\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,a\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 885 leaves):

$$\frac{1}{4\,d\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,a\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(-i\,(2\,A+3\,B)\,\text{Cos}\left[c+\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]-\right.$$
$$2\,i\,A\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]-$$
$$3\,i\,B\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+$$
$$2\,i\,(2\,A+3\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\text{Cos}[c+d\,x]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)-$$
$$2\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-$$
$$3\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+$$
$$8\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-$$
$$2\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$
$$2\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+$$
$$\left.3\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 507: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 3, 153 leaves, 5 steps):

$$\frac{a^{3/2}\,(12\,A+7\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{4\,d}+\frac{a^2\,(4\,A+5\,B)\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,B\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 532 leaves):

$$\frac{1}{8\sqrt{2}\,d\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\,a\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-i\,(12\,A+7\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$i\,(12\,A+7\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$12\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$7\,B\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$8\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$\left.12\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,\sqrt{2}\,B\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)$$

- **Problem 508: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 200 leaves, 6 steps):

$$\frac{a^{3/2}\,(14\,A+11\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{8\,d}+$$
$$\frac{a^2\,(6\,A+7\,B)\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a\,B\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a^2\,(14\,A+11\,B)\,\text{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 616 leaves):

$$\frac{1}{48\sqrt{2}\, d\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}}\, a\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]$$
$$\Bigg(-3\,i\,(14\,A+11\,B)\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]+$$
$$3\,i\,(14\,A+11\,B)\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{d\,x}{2}\right]+i\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$42\,A\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+$$
$$33\,B\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]+$$
$$72\sqrt{2}\,A\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+$$
$$52\sqrt{2}\,B\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+12\sqrt{2}\,A\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+$$
$$18\sqrt{2}\,B\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+4\sqrt{2}\,B\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{5}{2}(c+d\,x)\right]\Bigg)$$

- **Problem 509: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 247 leaves, 7 steps) :

$$\frac{a^{3/2}\,(88\,A+75\,B)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,d}+\frac{a^2\,(8\,A+9\,B)\,\mathrm{Sin}[c+d\,x]}{24\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}}+$$
$$\frac{a\,B\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a^2\,(88\,A+75\,B)\,\mathrm{Sin}[c+d\,x]}{96\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{a^2\,(88\,A+75\,B)\,\mathrm{Sin}[c+d\,x]}{64\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 371 leaves) :

$$-\frac{1}{768\,d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}}\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(-\frac{1}{\sqrt{2}}3\,i\,(88\,A+75\,B)\,e^{-\frac{1}{2}\,i\,d\,x}\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\right)\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)+$$
$$(296\,A+285\,B+2\,(88\,A+93\,B)\,\text{Cos}[c+d\,x]+4\,(8\,A+15\,B)\,\text{Cos}[2\,(c+d\,x)]+12\,B\,\text{Cos}[3\,(c+d\,x)])$$
$$\left.\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\left(\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 514: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 3, 192 leaves, 6 steps):

$$\frac{2\,a^{5/2}\,B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a^3\,(32\,A+35\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,a^2\,(8\,A+5\,B)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 3, 946 leaves):

$$\frac{1}{4} B \sqrt{\text{Cos}[c+d x]}\ (a\ (1+\text{Cos}[c+d x]))^{5/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\text{Sec}[c+d x]}$$

$$\left(\left(\frac{1}{2}\, i\, \text{Sin}\left[\frac{c}{2}\right]\right) \left(-\left(2\, i\, e^{\frac{i d x}{2}}\, \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \left(\text{Cos}\left[\frac{c}{2}\right]-i\, \text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right) -$$

$$\left(2\, i\, e^{\frac{i d x}{2}}\, \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right] \left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right) +$$

$$\frac{1}{2} \text{Cos}\left[\frac{c}{2}\right] \left(-\left(2\, i\, e^{\frac{i d x}{2}}\, \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \left(\text{Cos}\left[\frac{c}{2}\right]-i\, \text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right) +$$

$$\left(2\, i\, e^{\frac{i d x}{2}}\, \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right] \left(\text{Cos}\left[\frac{c}{2}\right]+i\, \text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right)\right) +$$

$$(a\ (1+\text{Cos}[c+d x]))^{5/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\text{Sec}[c+d x]} \left(\frac{(43 A+40 B)\ \text{Cos}\left[\frac{d x}{2}\right] \text{Sin}\left[\frac{c}{2}\right]}{30 d}+\frac{(43 A+40 B)\ \text{Cos}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]}{30 d}+\right.$$

$$\frac{A\, \text{Sec}[c+d x]^2\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{10 d}+$$

$$\left.\frac{\text{Sec}[c+d x]\ \left(14 A\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]+5 B\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}{30 d}\right)$$

- **Problem 515: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\, \text{Cos}[c+d x])^{5/2}\ (A+B\, \text{Cos}[c+d x])\ \text{Sec}[c+d x]^{5/2}\, dx$$

Optimal (type 3, 193 leaves, 6 steps):

$$\frac{a^{5/2}\ (2 A+5 B)\ \text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d x]}{\sqrt{a+a\, \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}{d}-\frac{a^3\ (14 A+3 B)\ \text{Sin}[c+d x]}{3 d \sqrt{a+a\, \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}+$$

$$\frac{2 a^2\ (2 A+B) \sqrt{a+a\, \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{d}+\frac{2 a A\ (a+a\, \text{Cos}[c+d x])^{3/2}\ \text{Sec}[c+d x]^{3/2}\ \text{Sin}[c+d x]}{3 d}$$

Result (type 3, 946 leaves):

$$\frac{1}{8}(2A+5B)\sqrt{\text{Cos}[c+dx]}\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\text{Sec}[c+dx]}$$
$$\left(\frac{1}{2}\,\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\text{i}\,e^{\frac{\text{i}dx}{2}}\,\text{Log}\left[2\left(e^{\text{i}dx}\,\text{Cos}\left[\frac{c}{2}\right]+\text{i}\,e^{\text{i}dx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-\text{i}dx}\left(\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+2\,\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,\text{i}\,e^{\frac{\text{i}dx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-\text{i}dx}\left(\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+2\,\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\text{i}\,e^{\frac{\text{i}dx}{2}}\,\text{Log}\left[2\left(e^{\text{i}dx}\,\text{Cos}\left[\frac{c}{2}\right]+\text{i}\,e^{\text{i}dx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-\text{i}dx}\left(\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+2\,\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,\text{i}\,e^{\frac{\text{i}dx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\text{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-\text{i}dx}\left(\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\text{i}dx}\right)\text{Cos}[c]+2\,\text{i}\left(-1+e^{2\text{i}dx}\right)\text{Sin}[c]}\right)\right)\right)+$$
$$(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\text{Sec}[c+dx]}\left(\frac{(32A+9B)\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{24\,d}+\frac{B\,\text{Cos}\left[\frac{3dx}{2}\right]\text{Sin}\left[\frac{3c}{2}\right]}{8\,d}+\right.$$
$$\frac{(32A+9B)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{24\,d}+$$
$$\left.\frac{B\,\text{Cos}\left[\frac{3c}{2}\right]\text{Sin}\left[\frac{3dx}{2}\right]}{8\,d}+\frac{A\,\text{Sec}[c+dx]\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]}{6\,d}\right)$$

- **Problem 516: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+dx])^{5/2}\,(A+B\,\text{Cos}[c+dx])\,\text{Sec}[c+dx]^{3/2}\,dx$$

Optimal (type 3, 198 leaves, 6 steps):

$$\frac{a^{5/2}(20A+19B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{4\,d}-\frac{a^3(4A-9B)\,\text{Sin}[c+dx]}{4\,d\sqrt{a+a\,\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}-$$
$$\frac{a^2(4A-B)\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{2\,d\sqrt{\text{Sec}[c+dx]}}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+dx])^{3/2}\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{d}$$

Result (type 3, 973 leaves):

$$\frac{1}{32}(20A+19B)\sqrt{\cos[c+dx]}\,(a(1+\cos[c+dx]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\sec[c+dx]}$$

$$\left(\frac{1}{2}\,i\,\sin\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\cos\left[\frac{c}{2}\right]+i\,e^{i d x}\sin\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right]\left(\cos\left[\frac{c}{2}\right]-i\sin\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i d x}{2}}\,\text{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right]\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right)+$$

$$\frac{1}{2}\cos\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\cos\left[\frac{c}{2}\right]+i\,e^{i d x}\sin\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right]\left(\cos\left[\frac{c}{2}\right]-i\sin\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i d x}{2}}\,\text{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right]\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right)\right)+$$

$$(a(1+\cos[c+dx]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\sec[c+dx]}\left(\frac{3(4A-3B)\cos\left[\frac{dx}{2}\right]\sin\left[\frac{c}{2}\right]}{32d}+\frac{(2A+5B)\cos\left[\frac{3dx}{2}\right]\sin\left[\frac{3c}{2}\right]}{16d}+\right.$$

$$\frac{B\cos\left[\frac{5dx}{2}\right]\sin\left[\frac{5c}{2}\right]}{32d}+\frac{3(4A-3B)\cos\left[\frac{c}{2}\right]\sin\left[\frac{dx}{2}\right]}{32d}+$$

$$\left.\frac{(2A+5B)\cos\left[\frac{3c}{2}\right]\sin\left[\frac{3dx}{2}\right]}{16d}+\frac{B\cos\left[\frac{5c}{2}\right]\sin\left[\frac{5dx}{2}\right]}{32d}\right)$$

- **Problem 517: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\cos[c+dx])^{5/2}(A+B\cos[c+dx])\sqrt{\sec[c+dx]}\,dx$$

Optimal (type 3, 200 leaves, 6 steps):

$$\frac{a^{5/2}(38A+25B)\,\text{ArcSin}\left[\frac{\sqrt{a}\sin[c+dx]}{\sqrt{a+a\cos[c+dx]}}\right]\sqrt{\cos[c+dx]}\sqrt{\sec[c+dx]}}{8d}+$$

$$\frac{a^3(54A+49B)\sin[c+dx]}{24d\sqrt{a+a\cos[c+dx]}\sqrt{\sec[c+dx]}}+\frac{a^2(2A+3B)\sqrt{a+a\cos[c+dx]}\sin[c+dx]}{4d\sqrt{\sec[c+dx]}}+\frac{aB(a+a\cos[c+dx])^{3/2}\sin[c+dx]}{3d\sqrt{\sec[c+dx]}}$$

Result (type 3, 618 leaves):

$$\frac{1}{48\sqrt{2}\,d\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\,a^2\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\Bigg(-3\,i\,(38\,A+25\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+$$
$$3\,i\,(38\,A+25\,B)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$114\,A\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$75\,B\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$120\sqrt{2}\,A\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$124\sqrt{2}\,B\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+12\sqrt{2}\,A\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$
$$30\sqrt{2}\,B\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\sqrt{2}\,B\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\Bigg)$$

- **Problem 518: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 247 leaves, 7 steps):

$$\frac{a^{5/2}\,(200\,A+163\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{64\,d}+\frac{a^3\,(104\,A+95\,B)\,\text{Sin}[c+d\,x]}{96\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+$$
$$\frac{a^2\,(8\,A+11\,B)\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a\,B\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{4\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a^3\,(200\,A+163\,B)\,\text{Sin}[c+d\,x]}{64\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 1081 leaves):

$$\frac{1}{512}(200\,A+163\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(\frac{1}{2}\,i\,\mathrm{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)\right)+$$

$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{(376\,A+265\,B)\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{1536\,d}+\frac{(64\,A+55\,B)\,\mathrm{Cos}\left[\frac{3\,d\,x}{2}\right]\mathrm{Sin}\left[\frac{3\,c}{2}\right]}{192\,d}+\right.$$

$$\frac{(40\,A+47\,B)\,\mathrm{Cos}\left[\frac{5\,d\,x}{2}\right]\mathrm{Sin}\left[\frac{5\,c}{2}\right]}{512\,d}+\frac{(2\,A+5\,B)\,\mathrm{Cos}\left[\frac{7\,d\,x}{2}\right]\mathrm{Sin}\left[\frac{7\,c}{2}\right]}{192\,d}+$$

$$\frac{B\,\mathrm{Cos}\left[\frac{9\,d\,x}{2}\right]\mathrm{Sin}\left[\frac{9\,c}{2}\right]}{256\,d}-\frac{(376\,A+265\,B)\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{1536\,d}+$$

$$\frac{(64\,A+55\,B)\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{192\,d}+\frac{(40\,A+47\,B)\,\mathrm{Cos}\left[\frac{5\,c}{2}\right]\mathrm{Sin}\left[\frac{5\,d\,x}{2}\right]}{512\,d}+$$

$$\left.\frac{(2\,A+5\,B)\,\mathrm{Cos}\left[\frac{7\,c}{2}\right]\mathrm{Sin}\left[\frac{7\,d\,x}{2}\right]}{192\,d}+\frac{B\,\mathrm{Cos}\left[\frac{9\,c}{2}\right]\mathrm{Sin}\left[\frac{9\,d\,x}{2}\right]}{256\,d}\right)$$

- **Problem 519: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 294 leaves, 8 steps) :

$$\frac{a^{5/2}\,(326 A+283 B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{128 d}+$$

$$\frac{a^3\,(170 A+157 B)\,\text{Sin}[c+d x]}{240 d\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{5/2}}+\frac{a^2\,(10 A+13 B)\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{40 d\,\text{Sec}[c+d x]^{5/2}}+$$

$$\frac{a B\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{5 d\,\text{Sec}[c+d x]^{5/2}}+\frac{a^3\,(326 A+283 B)\,\text{Sin}[c+d x]}{192 d\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}}+\frac{a^3\,(326 A+283 B)\,\text{Sin}[c+d x]}{128 d\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 1135 leaves) :

$$\frac{1}{1024}\,(326 A+283 B)\,\sqrt{\text{Cos}[c+d x]}\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}$$

$$\left(\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\right)\left(-\left(2\,i\,e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i d x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i d x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right)\right)+$$

$$(a\,(1+\text{Cos}[c+d x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}\left(-\frac{(2650 A+2309 B)\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{15360 d}+\right.$$

$$\frac{(550 A+509 B)\,\text{Cos}\left[\frac{3 d x}{2}\right]\text{Sin}\left[\frac{3 c}{2}\right]}{1920 d}+$$

$$\frac{(94 A+95 B)\,\text{Cos}\left[\frac{5 d x}{2}\right]\text{Sin}\left[\frac{5 c}{2}\right]}{1024 d}+$$

$$\frac{(25 A+32 B)\,\text{Cos}\left[\frac{7 d x}{2}\right]\text{Sin}\left[\frac{7 c}{2}\right]}{960 d}+$$

$$\frac{(2 A+5 B)\,\text{Cos}\left[\frac{9 d x}{2}\right]\text{Sin}\left[\frac{9 c}{2}\right]}{512 d}+$$

$$\frac{B\,\text{Cos}\left[\frac{11\,d\,x}{2}\right]\,\text{Sin}\left[\frac{11\,c}{2}\right]}{640\,d} - \frac{(2650\,A + 2309\,B)\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{15\,360\,d} + \frac{(550\,A + 509\,B)\,\text{Cos}\left[\frac{3\,c}{2}\right]\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{1920\,d} + \frac{(94\,A + 95\,B)\,\text{Cos}\left[\frac{5\,c}{2}\right]\,\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{1024\,d} + \frac{(25\,A + 32\,B)\,\text{Cos}\left[\frac{7\,c}{2}\right]\,\text{Sin}\left[\frac{7\,d\,x}{2}\right]}{960\,d} + \frac{(2\,A + 5\,B)\,\text{Cos}\left[\frac{9\,c}{2}\right]\,\text{Sin}\left[\frac{9\,d\,x}{2}\right]}{512\,d} + \frac{B\,\text{Cos}\left[\frac{11\,c}{2}\right]\,\text{Sin}\left[\frac{11\,d\,x}{2}\right]}{640\,d}\Bigg)$$

- **Problem 520: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{(A + B\,\text{Cos}[c + d\,x])\,\text{Sec}[c + d\,x]^{11/2}}{\sqrt{a + a\,\text{Cos}[c + d\,x]}}\,dx$$

Optimal (type 3, 295 leaves, 9 steps):

$$-\frac{\sqrt{2}\,(A - B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c + d\,x]}\,\sqrt{\text{Sec}[c + d\,x]}}{\sqrt{a}\,d} + \frac{2\,(257\,A - 129\,B)\,\sqrt{\text{Sec}[c + d\,x]}\,\text{Sin}[c + d\,x]}{315\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} - \frac{2\,(29\,A - 93\,B)\,\text{Sec}[c + d\,x]^{3/2}\,\text{Sin}[c + d\,x]}{315\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} + \frac{2\,(19\,A - 3\,B)\,\text{Sec}[c + d\,x]^{5/2}\,\text{Sin}[c + d\,x]}{105\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} - \frac{2\,(A - 9\,B)\,\text{Sec}[c + d\,x]^{7/2}\,\text{Sin}[c + d\,x]}{63\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} + \frac{2\,A\,\text{Sec}[c + d\,x]^{9/2}\,\text{Sin}[c + d\,x]}{9\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}}$$

Result (type 3, 264 leaves):

$$\frac{1}{\sqrt{a\,(1 + \text{Cos}[c + d\,x])}}\,\text{Cos}\left[\frac{1}{2}\,(c + d\,x)\right]\Bigg(1 / d2\,i\,(A - B)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1 + e^{2\,i\,(c+d\,x)}}}\,\sqrt{1 + e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1 + e^{i\,(c+d\,x)}\right] - \text{Log}\left[1 - e^{i\,(c+d\,x)} + \sqrt{2}\,\sqrt{1 + e^{2\,i\,(c+d\,x)}}\right]\right) + 1 / (630\,d)\,(1279\,A - 423\,B + (-214\,A + 918\,B)\,\text{Cos}[c + d\,x] + 8\,(157\,A - 69\,B)\,\text{Cos}[2\,(c + d\,x)] - 58\,A\,\text{Cos}[3\,(c + d\,x)] + 186\,B\,\text{Cos}[3\,(c + d\,x)] + 257\,A\,\text{Cos}[4\,(c + d\,x)] - 129\,B\,\text{Cos}[4\,(c + d\,x)])\,\text{Sec}[c + d\,x]^{9/2}\,\text{Sin}\left[\frac{1}{2}\,(c + d\,x)\right]\Bigg)$$

### Problem 521: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{9/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 250 leaves, 8 steps):

$$\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}-\frac{2\,(43\,A-91\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,(31\,A-7\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-7\,B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 242 leaves):

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}$$
$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-1/d2\,i\,(A-B)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$
$$1/(105\,d)\,(-122\,A+14\,B+3\,(47\,A-119\,B)\,\text{Cos}[c+d\,x]+(-62\,A+14\,B)\,\text{Cos}[2\,(c+d\,x)]+43\,A\,\text{Cos}[3\,(c+d\,x)]-91\,B\,\text{Cos}[3\,(c+d\,x)])$$
$$\left.\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

### Problem 522: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 207 leaves, 7 steps):

$$-\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+$$
$$\frac{2\,(13\,A-5\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-5\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 215 leaves):

$$\left(2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(15\,i\,(A-B)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.\right.$$

$$\left.\left.(19\,A-5\,B-2\,(A-5\,B)\,\text{Cos}[c+d\,x]+(13\,A-5\,B)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(15\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 523: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 162 leaves, 6 steps):

$$\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}-$$

$$\frac{2\,(A-3\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 198 leaves):

$$-\frac{1}{3\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}$$

$$2\,i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(3\,(A-B)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$

$$\left.2\,i\,(-A+(A-3\,B)\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 524: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 119 leaves, 5 steps):

$$-\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+\frac{2\,A\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 179 leaves):

$$\frac{1}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\text{i}\,(A-B)\,e^{-\frac{1}{2}\,\text{i}\,(c+d\,x)}\sqrt{\frac{e^{\text{i}\,(c+d\,x)}}{1+e^{2\,\text{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\left(\text{Log}\left[1+e^{\text{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\text{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]\right)+2\,A\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 525: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 140 leaves, 6 steps):

$$\frac{2\,B\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}$$

Result (type 3, 267 leaves):

$$\frac{1}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\sqrt{2}\,e^{-\frac{1}{2}\,\text{i}\,(c+d\,x)}\sqrt{\frac{e^{\text{i}\,(c+d\,x)}}{1+e^{2\,\text{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(B\,d\,x-\text{i}\,B\,\text{ArcSinh}\left[e^{\text{i}\,(c+d\,x)}\right]-\text{i}\,\sqrt{2}\,(A-B)\,\text{Log}\left[1+e^{\text{i}\,(c+d\,x)}\right]+\text{i}\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]+\text{i}\,\sqrt{2}\,A\,\text{Log}\left[1-e^{\text{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]-\text{i}\,\sqrt{2}\,B\,\text{Log}\left[1-e^{\text{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]\right)$$

## Problem 526: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 181 leaves, 7 steps):

$$\frac{(2\,A-B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+\frac{B\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 542 leaves) :

$$\frac{1}{4 d \sqrt{a (1+\text{Cos}[c+d x])}} e^{-2 i (c+d x)} \left(1+e^{i (c+d x)}\right) \left(i B-i B e^{i (c+d x)}+i B e^{2 i (c+d x)}-i B e^{3 i (c+d x)}+2 A d e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} x-B d e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} x- i (2 A-B) e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{ArcSinh}\left[e^{i (c+d x)}\right]+2 i \sqrt{2} (A-B) e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1+e^{i (c+d x)}\right]+ 2 i A e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-i B e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-2 i \sqrt{2} A e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]+2 i \sqrt{2} B e^{i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) \sqrt{\text{Sec}[c+d x]}$$

- **Problem 527: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B \text{Cos}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]} \text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 3, 230 leaves, 8 steps) :

$$-\frac{(4 A-7 B) \text{ArcSin}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}{4 \sqrt{a} d}+\frac{\sqrt{2} (A-B) \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}{\sqrt{a} d}+\frac{B \text{Sin}[c+d x]}{2 d \sqrt{a+a \text{Cos}[c+d x]} \text{Sec}[c+d x]^{3/2}}+\frac{(4 A-B) \text{Sin}[c+d x]}{4 d \sqrt{a+a \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 638 leaves) :

$$\frac{1}{16 d \sqrt{a (1+\text{Cos}[c+d x])}} e^{-3 i (c+d x)} \left(1+e^{i (c+d x)}\right) \left(i B+4 i A e^{i (c+d x)}-2 i B e^{i (c+d x)}-4 i A e^{2 i (c+d x)}+3 i B e^{2 i (c+d x)}+4 i A e^{3 i (c+d x)}-3 i B e^{3 i (c+d x)}-4 i A e^{4 i (c+d x)}+2 i B e^{4 i (c+d x)}- i B e^{5 i (c+d x)}-4 A d e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} x+7 B d e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} x+i (4 A-7 B) e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{ArcSinh}\left[e^{i (c+d x)}\right]- 8 i \sqrt{2} (A-B) e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1+e^{i (c+d x)}\right]-4 i A e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+ 7 i B e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+8 i \sqrt{2} A e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]- 8 i \sqrt{2} B e^{2 i (c+d x)} \sqrt{1+e^{2 i (c+d x)}} \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) \sqrt{\text{Sec}[c+d x]}$$

- **Problem 528: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(a A+(A b+a B) \text{Cos}[c+d x]+b B \text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]}}{\sqrt{a+a \text{Cos}[c+d x]}} \, dx$$

Optimal (type 3, 192 leaves, 7 steps) :

$$\frac{(2 A b+2 a B-b B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{\sqrt{a}\,d}+$$

$$\frac{\sqrt{2}\,(a-b)\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{\sqrt{a}\,d}+\frac{b B\,\text{Sin}[c+d x]}{d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 807 leaves) :

$$\frac{1}{4 d\sqrt{a\,(1+\text{Cos}[c+d x])}}$$

$$e^{-2 i (c+d x)}\left(1+e^{i (c+d x)}\right)\Big(i b B-i b B e^{i (c+d x)}+i b B e^{2 i (c+d x)}-i b B e^{3 i (c+d x)}+2 A b d e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,x+2 a B d e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,x-$$

$$b B d e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,x-i\,(2 A b+2 a B-b B)\,e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{ArcSinh}\left[e^{i (c+d x)}\right]-$$

$$2 i\sqrt{2}\,(a-b)\,(A-B)\,e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1+e^{i (c+d x)}\right]+2 i A b e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+$$

$$2 i a B e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-i b B e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+$$

$$2 i\sqrt{2}\,a A e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]-2 i\sqrt{2}\,A b e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}$$

$$\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]-2 i\sqrt{2}\,a B e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]+$$

$$2 i\sqrt{2}\,b B e^{i (c+d x)}\sqrt{1+e^{2 i (c+d x)}}\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]\Big)\sqrt{\text{Sec}[c+d x]}$$

- **Problem 529: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^{9/2}}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 317 leaves, 9 steps) :

$$\frac{(19 A-15 B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{2\sqrt{2}\,a^{3/2}\,d}-$$

$$\frac{(1201 A-1029 B)\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{210 a d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{(397 A-273 B)\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{210 a d\sqrt{a+a\,\text{Cos}[c+d x]}}-$$

$$\frac{(67 A-63 B)\,\text{Sec}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{70 a d\sqrt{a+a\,\text{Cos}[c+d x]}}-\frac{(A-B)\,\text{Sec}[c+d x]^{7/2}\,\text{Sin}[c+d x]}{2 d\,(a+a\,\text{Cos}[c+d x])^{3/2}}+\frac{(11 A-7 B)\,\text{Sec}[c+d x]^{7/2}\,\text{Sin}[c+d x]}{14 a d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 279 leaves) :

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(-1/d\,\mathbb{i}\,(19\,A-15\,B)\,e^{-\frac{1}{2}\,\mathbb{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\mathbb{i}\,(c+d\,x)}}{1+e^{2\,\mathbb{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\mathbb{i}\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{\mathbb{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathbb{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathbb{i}\,(c+d\,x)}}\right]\right)-1/(840\,d)\,(2339\,A-2751\,B+24\,(213\,A-217\,B)\,\text{Cos}[c+d\,x]+60\,(67\,A-63\,B)\,\text{Cos}[2\,(c+d\,x)]+1608\,A\,\text{Cos}[3\,(c+d\,x)]-1512\,B\,\text{Cos}[3\,(c+d\,x)]+1201\,A\,\text{Cos}[4\,(c+d\,x)]-1029\,B\,\text{Cos}[4\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}[c+d\,x]^{7/2}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 530: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 270 leaves, 8 steps):

$$-\frac{(15\,A-11\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}+\frac{(147\,A-95\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{30\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(39\,A-35\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{30\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(A-B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(9\,A-5\,B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{10\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 253 leaves):

$$\frac{1}{60\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(60\,\mathbb{i}\,(15\,A-11\,B)\,e^{-\frac{1}{2}\,\mathbb{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\mathbb{i}\,(c+d\,x)}}{1+e^{2\,\mathbb{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\mathbb{i}\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{\mathbb{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathbb{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathbb{i}\,(c+d\,x)}}\right]\right)+(264\,A-120\,B+(393\,A-205\,B)\,\text{Cos}[c+d\,x]+24\,(9\,A-5\,B)\,\text{Cos}[2\,(c+d\,x)]+147\,A\,\text{Cos}[3\,(c+d\,x)]-95\,B\,\text{Cos}[3\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}[c+d\,x]^{5/2}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 531: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 223 leaves, 7 steps):

$$\frac{(11\,A-7\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-$$
$$\frac{(19\,A-15\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(A-B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(7\,A-3\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 232 leaves):

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$
$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(-1/d\,\text{i}\,(11\,A-7\,B)\,e^{-\frac{1}{2}\,\text{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\text{i}\,(c+d\,x)}}{1+e^{2\,\text{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{\text{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\text{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]\right)-\right.$$
$$\left.1/(6\,d)\,(11\,A-15\,B+24\,(A-B)\,\text{Cos}[c+d\,x]+(19\,A-15\,B)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}[c+d\,x]^{3/2}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 532: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 176 leaves, 6 steps):

$$-\frac{(7\,A-3\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-$$
$$\frac{(A-B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(5\,A-B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 208 leaves):

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$
$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(\text{i}\,(7\,A-3\,B)\,e^{-\frac{1}{2}\,\text{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\text{i}\,(c+d\,x)}}{1+e^{2\,\text{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{\text{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\text{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\text{i}\,(c+d\,x)}}\right]\right)+\right.$$
$$\left.(4\,A+(5\,A-B)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 533: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\sqrt{\mathrm{Sec}[c+d\,x]}}{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 127 leaves, 5 steps):

$$\frac{(3\,A+B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 213 leaves):

$$-\frac{1}{d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}}$$

$$i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left((3\,A+B)\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$

$$\left.\frac{1}{2}\,i\,(A-B)\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{\mathrm{Sec}[c+d\,x]}\left(\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)\right)$$

## Problem 534: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 185 leaves, 7 steps):

$$\frac{2\,B\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{a^{3/2}\,d}+$$

$$\frac{(A-5\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}+\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 326 leaves):

$$\frac{1}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$

$$\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(\sqrt{2}\;e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(4\,B\,d\,x-4\,i\,B\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\sqrt{2}\,(A-5\,B)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$

$$4\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+i\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-5\,i\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\Big)+$$

$$\left.(A-B)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{\text{Sec}[c+d\,x]}\left(-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)\right)$$

- **Problem 535: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 237 leaves, 8 steps):

$$\frac{(2\,A-3\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{a^{3/2}\,d}-\frac{(5\,A-9\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\sqrt{2}\,a^{3/2}\,d}+$$

$$\frac{(A-B)\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}-\frac{(A-3\,B)\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 944 leaves):

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\,i\,A\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}$$

$$3\,i\,B\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\,2\sqrt{2}\,A\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3$$

$$\left(d\,x-i\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-$$

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\,3\sqrt{2}\,B\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3$$

$$\left(d\,x-i\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{2\,A\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{c}{2}\right]-B\,\text{Sin}\left[\frac{c}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{2\,B\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{d}-\frac{2\,A\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{2\,B\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{d}\right)$$

- **Problem 536: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 317 leaves, 9 steps):

$$-\frac{(283\,A-163\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\sqrt{\text{Sec}[c+d\,x]}}{16\sqrt{2}\,a^{5/2}\,d}+$$

$$\frac{(2671\,A-1495\,B)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{240\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(787\,A-475\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{240\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$

$$\frac{(A-B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(21\,A-13\,B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(157\,A-85\,B)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{80\,a^2\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 278 leaves) :

$$\frac{1}{960\, d\, (a\, (1+\text{Cos}[c+d\, x]))^{5/2}}$$

$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5 \left(240\, i\, (283\, A-163\, B)\, e^{-\frac{1}{2}\, i\, (c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\, \sqrt{1+e^{2\,i\,(c+d\,x)}}\, \left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$(15\,053\, A-7685\, B+10\,(2605\, A-1381\, B)\,\text{Cos}[c+d\,x]+108\,(157\, A-85\, B)\,\text{Cos}[2\,(c+d\,x)]+9110\, A\,\text{Cos}[3\,(c+d\,x)]-$$
$$\left. 5030\, B\,\text{Cos}[3\,(c+d\,x)]+2671\, A\,\text{Cos}[4\,(c+d\,x)]-1495\, B\,\text{Cos}[4\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3 \text{Sec}[c+d\,x]^{5/2}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 537: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 270 leaves, 8 steps) :

$$\frac{(163\, A-75\, B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(299\, A-147\, B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{48\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$
$$\frac{(A-B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(17\, A-9\, B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(95\, A-39\, B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{48\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 261 leaves) :

$$\frac{1}{4\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}$$

$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5 \left(-1/d\,i\,(163\, A-75\, B)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$
$$1/(24\,d)\,(878\, A-510\, B+(1537\, A-825\, B)\,\text{Cos}[c+d\,x]+2\,(503\, A-255\, B)\,\text{Cos}[2\,(c+d\,x)]+299\, A\,\text{Cos}[3\,(c+d\,x)]-147\, B\,\text{Cos}[3\,(c+d\,x)])$$
$$\left.\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\text{Sec}[c+d\,x]^{3/2}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 538: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 223 leaves, 7 steps) :

$$-\frac{(75 A-19 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{16 \sqrt{2} a^{5/2} d}-$$

$$\frac{(A-B) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(13 A-5 B) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(49 A-9 B) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{16 a^{2} d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 236 leaves) :

$$\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^{5}\left(i (75 A-19 B) e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}}\left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+\right.\right.$$
$$\frac{1}{4}(113 A-9 B+2 (85 A-13 B) \operatorname{Cos}[c+d x]+(49 A-9 B) \operatorname{Cos}[2 (c+d x)])$$
$$\left.\left.\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^{3} \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right) \Big/ \left(4 d (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)$$

- **Problem 539: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{(A+B \operatorname{Cos}[c+d x]) \sqrt{\operatorname{Sec}[c+d x]}}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 176 leaves, 6 steps) :

$$\frac{(19 A+5 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{16 \sqrt{2} a^{5/2} d}-$$

$$\frac{(A-B) \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2} \sqrt{\operatorname{Sec}[c+d x]}}-\frac{(9 A-B) \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 233 leaves) :

$$-\left(i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^{5}\left((19 A+5 B) e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}}\left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+\frac{1}{4} i\right.\right.$$
$$\left.\left.(13 A-5 B+(9 A-B) \operatorname{Cos}[c+d x]) \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^{4} \sqrt{\operatorname{Sec}[c+d x]}\left(\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]\right)\right)\right) \Big/ \left(4 d (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)$$

## Problem 540: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 174 leaves, 6 steps):

$$\frac{(5\,A+3\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}+\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{(A+7\,B)\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 230 leaves):

$$\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5\left(-i\,(5\,A+3\,B)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{1}{4}\,(5\,A+3\,B+(A+7\,B)\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)\right)\Big/\left(4\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\right)$$

## Problem 541: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 234 leaves, 8 steps):

$$\frac{2\,B\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{a^{5/2}\,d}+\frac{(3\,A-43\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}+\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{4\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{(3\,A-11\,B)\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 347 leaves):

$$\frac{1}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}$$

$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5\left(\sqrt{2}\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(32\,B\,d\,x-32\,i\,B\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(3\,A-43\,B)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$

$$32\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+3\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-43\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\Big)+$$

$$\left.\frac{1}{2}\,(3\,A-11\,B+(7\,A-15\,B)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4\sqrt{\text{Sec}[c+d\,x]}\,\left(-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 542: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 286 leaves, 9 steps) :

$$\frac{(2\,A-5\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{a^{5/2}\,d}-\frac{(43\,A-115\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}+$$

$$\frac{(A-B)\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{5/2}}+\frac{(7\,A-15\,B)\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}-\frac{(11\,A-35\,B)\,\text{Sin}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 1037 leaves) :

$$\left(11\,i\,A\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(\text{Log}\left[1+e^{i(c+d x)}\right]-\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2i(c+d x)}}\right]\right)\right)\Big/$$
$$\left(4 d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\right)-$$
$$\left(35\,i\,B\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(\text{Log}\left[1+e^{i(c+d x)}\right]-\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2i(c+d x)}}\right]\right)\right)\Big/$$
$$\left(4 d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\right)+\frac{1}{d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}}4\sqrt{2}\,A\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5$$
$$\left(d x-i\,\text{ArcSinh}\left[e^{i(c+d x)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i(c+d x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2i(c+d x)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2i(c+d x)}}\right]\right)-$$
$$\frac{1}{d\,(a\,(1+\text{Cos}[c+d x]))^{5/2}}10\sqrt{2}\,B\,e^{-\frac{1}{2}i(c+d x)}\sqrt{\frac{e^{i(c+d x)}}{1+e^{2i(c+d x)}}}\sqrt{1+e^{2i(c+d x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5$$
$$\left(d x-i\,\text{ArcSinh}\left[e^{i(c+d x)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i(c+d x)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2i(c+d x)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i(c+d x)}+\sqrt{2}\sqrt{1+e^{2i(c+d x)}}\right]\right)+$$
$$\frac{1}{(a\,(1+\text{Cos}[c+d x]))^{5/2}}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}$$
$$\left(\frac{15\,(-A+B)\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{2 d}+\frac{4 B\,\text{Cos}\left[\frac{3 d x}{2}\right]\text{Sin}\left[\frac{3 c}{2}\right]}{d}-\frac{15\,(A-B)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{2 d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\left(19 A\,\text{Sin}\left[\frac{d x}{2}\right]-27 B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{4 d}+\right.$$
$$\left.\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-A\,\text{Sin}\left[\frac{d x}{2}\right]+B\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{2 d}+\frac{4 B\,\text{Cos}\left[\frac{3 c}{2}\right]\text{Sin}\left[\frac{3 d x}{2}\right]}{d}+\frac{(19 A-27 B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 543: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]^{5/2}}{(a+a\,\text{Cos}[c+d x])^{7/2}}\,dx$$

Optimal (type 3, 317 leaves, 9 steps) :

$$\frac{(1015\,A-363\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}-$$

$$\frac{(1887\,A-691\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,a^3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(A-B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}-\frac{(23\,A-11\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-$$

$$\frac{(109\,A-41\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{64\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(579\,A-199\,B)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{192\,a^3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 532 leaves) :

$$-\left(i\,(1015\,A-363\,B)\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$

$$\left(8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(-\frac{(1887\,A-691\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{12\,d}-\frac{(1887\,A-691\,B)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{12\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(451\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-199\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{24\,d}+\right.$$

$$\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(31\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-19\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{12\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{32\,A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}+$$

$$\left.\frac{(451\,A-199\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{(31\,A-19\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Tan}\left[\frac{c}{2}\right]}{12\,d}+\frac{(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 544: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 270 leaves, 8 steps) :

$$-\frac{3\,(121\,A-21\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}-\frac{(A-B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}}-$$

$$\frac{(19\,A-7\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(199\,A-43\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(691\,A-103\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,a^3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 259 leaves) :

$$\frac{1}{24\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}$$

$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^7\left(9\,\mathrm{i}\,(121\,A-21\,B)\,e^{-\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\mathrm{i}\,(c+d\,x)}}{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\right]\right)+\right.$$

$$\frac{1}{16}\,(5284\,A-532\,B+9\,(941\,A-121\,B)\,\text{Cos}[c+d\,x]+4\,(937\,A-133\,B)\,\text{Cos}[2\,(c+d\,x)]+691\,A\,\text{Cos}[3\,(c+d\,x)]-103\,B\,\text{Cos}[3\,(c+d\,x)])$$

$$\left.\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 545: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}{(a+a\,\text{Cos}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 3, 223 leaves, 7 steps):

$$\frac{(63\,A+13\,B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}-$$

$$\frac{(A-B)\,\text{Sin}[c+d\,x]}{6\,d\,(a+a\,\text{Cos}[c+d\,x])^{7/2}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{(5\,A-B)\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{(103\,A+5\,B)\,\text{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 505 leaves):

$$-\left(\mathrm{i}\,(63\,A+13\,B)\,e^{-\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}\,\sqrt{\frac{e^{\mathrm{i}\,(c+d\,x)}}{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\text{Log}\left[1+e^{\mathrm{i}\,(c+d\,x)}\right]-\text{Log}\left[1-e^{\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\right]\right)\right)\Big/$$

$$\left(8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{7/2}}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\,\sqrt{\text{Sec}[c+d\,x]}\,\left(-\frac{(103\,A+5\,B)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]}{12\,d}-\frac{(103\,A+5\,B)\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{12\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(7\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+5\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{12\,d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\left(43\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+17\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{24\,d}+$$

$$\left.\frac{(43\,A+17\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{(7\,A+5\,B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Tan}\left[\frac{c}{2}\right]}{12\,d}+\frac{(A-B)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 546: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 221 leaves, 7 steps):

$$\frac{(13\,A+7\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}+\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{6\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{(A+3\,B)\,\mathrm{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\sqrt{\mathrm{Sec}[c+d\,x]}}-\frac{(5\,A-17\,B)\,\mathrm{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 505 leaves):

$$-\left(i\,(13\,A+7\,B)\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\left(\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)\right)\Big/$$

$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{7/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+d\,x]))^{7/2}}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^7\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{(5\,A-17\,B)\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{12\,d}-\frac{(5\,A-17\,B)\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{12\,d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(5\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-17\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{12\,d}+\right.$$

$$\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(17\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+19\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{24\,d}+$$

$$\left.\frac{(17\,A+19\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{24\,d}+\frac{(5\,A-17\,B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{12\,d}-\frac{(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 547: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 221 leaves, 7 steps):

$$\frac{(7\,A+5\,B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,\sqrt{2}\,a^{7/2}\,d}+\frac{(A-B)\,\mathrm{Sin}[c+d\,x]}{6\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{(A-13\,B)\,\mathrm{Sin}[c+d\,x]}{48\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{(17\,A+67\,B)\,\mathrm{Sin}[c+d\,x]}{192\,a^2\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 505 leaves):

$$-\left(i\,(7A+5B)\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\sqrt{1+e^{2i(c+dx)}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\left(\mathrm{Log}\left[1+e^{i(c+dx)}\right]-\mathrm{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/$$

$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{7/2}\right)+\frac{1}{(a\,(1+\mathrm{Cos}[c+dx]))^{7/2}}\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\sqrt{\mathrm{Sec}[c+dx]}$$

$$\left(\frac{(17A+67B)\,\mathrm{Cos}\left[\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{12d}+\frac{(17A+67B)\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{12d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(19A\,\mathrm{Sin}\left[\frac{dx}{2}\right]-151B\,\mathrm{Sin}\left[\frac{dx}{2}\right]\right)}{24d}+\right.$$

$$\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\left(A\,\mathrm{Sin}\left[\frac{dx}{2}\right]-B\,\mathrm{Sin}\left[\frac{dx}{2}\right]\right)}{3d}+\frac{\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\left(-17A\,\mathrm{Sin}\left[\frac{dx}{2}\right]+29B\,\mathrm{Sin}\left[\frac{dx}{2}\right]\right)}{12d}+$$

$$\left.\frac{(19A-151B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Tan}\left[\frac{c}{2}\right]}{24d}-\frac{(17A-29B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Tan}\left[\frac{c}{2}\right]}{12d}+\frac{(A-B)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Tan}\left[\frac{c}{2}\right]}{3d}\right)$$

- **Problem 548: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+dx]}{(a+a\,\mathrm{Cos}[c+dx])^{7/2}\,\mathrm{Sec}[c+dx]^{5/2}}\,dx$$

Optimal (type 3, 281 leaves, 9 steps):

$$\frac{2B\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{\mathrm{Sec}[c+dx]}}{a^{7/2}\,d}+\frac{(5A-177B)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{\mathrm{Sec}[c+dx]}}{64\sqrt{2}\,a^{7/2}\,d}+$$

$$\frac{(A-B)\,\mathrm{Sin}[c+dx]}{6d\,(a+a\,\mathrm{Cos}[c+dx])^{7/2}\,\mathrm{Sec}[c+dx]^{5/2}}+\frac{(5A-17B)\,\mathrm{Sin}[c+dx]}{48\,a\,d\,(a+a\,\mathrm{Cos}[c+dx])^{5/2}\,\mathrm{Sec}[c+dx]^{3/2}}+\frac{(5A-49B)\,\mathrm{Sin}[c+dx]}{64\,a^2\,d\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}\sqrt{\mathrm{Sec}[c+dx]}}$$

Result (type 3, 621 leaves):

$$\left(e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(128 B d x-128 i B \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]-i \sqrt{2} (5 A-177 B) \operatorname{Log}\left[1+e^{i (c+d x)}\right]+\right.\right.$$

$$\left.\left. 128 i B \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+5 i \sqrt{2} A \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]-177 i \sqrt{2} B \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$

$$\left(8 \sqrt{2} d (a (1+\operatorname{Cos}[c+d x]))^{7/2}\right)+\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{7/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\operatorname{Sec}[c+d x]}$$

$$\left(\frac{(67 A-247 B) \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]}{12 d}+\frac{(67 A-247 B) \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]}{12 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(29 A \operatorname{Sin}\left[\frac{d x}{2}\right]-41 B \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{12 d}+\right.$$

$$\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(-A \operatorname{Sin}\left[\frac{d x}{2}\right]+B \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{3 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(-151 A \operatorname{Sin}\left[\frac{d x}{2}\right]+379 B \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{24 d}-$$

$$\left.\frac{(151 A-379 B) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{24 d}+\frac{(29 A-41 B) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{12 d}-\frac{(A-B) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 549: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B \operatorname{Cos}[c+d x]}{(a+a \operatorname{Cos}[c+d x])^{7/2} \operatorname{Sec}[c+d x]^{7/2}} \, dx$$

Optimal (type 3, 333 leaves, 10 steps):

$$\frac{(2 A-7 B) \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{a^{7/2} d}-$$

$$\frac{(177 A-637 B) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{64 \sqrt{2} a^{7/2} d}+\frac{(A-B) \operatorname{Sin}[c+d x]}{6 d (a+a \operatorname{Cos}[c+d x])^{7/2} \operatorname{Sec}[c+d x]^{7/2}}+$$

$$\frac{(3 A-7 B) \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sec}[c+d x]^{5/2}}+\frac{(79 A-259 B) \operatorname{Sin}[c+d x]}{192 a^2 d (a+a \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^{3/2}}-\frac{7 (7 A-27 B) \operatorname{Sin}[c+d x]}{64 a^3 d \sqrt{a+a \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 1125 leaves):

$$\left(49\, i\, A\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$
$$\left(8 d \left(a (1+\text{Cos}[c+d x])\right)^{7/2}\right) -$$
$$\left(189\, i\, B\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$
$$\left(8 d \left(a (1+\text{Cos}[c+d x])\right)^{7/2}\right) + \frac{1}{d \left(a (1+\text{Cos}[c+d x])\right)^{7/2}} 8 \sqrt{2}\, A\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7$$
$$\left(d x - i\, \text{ArcSinh}\left[e^{i (c+d x)}\right] + i \sqrt{2}\, \text{Log}\left[1+e^{i (c+d x)}\right] + i\, \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right] - i \sqrt{2}\, \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) -$$
$$\frac{1}{d \left(a (1+\text{Cos}[c+d x])\right)^{7/2}} 28 \sqrt{2}\, B\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7$$
$$\left(d x - i\, \text{ArcSinh}\left[e^{i (c+d x)}\right] + i \sqrt{2}\, \text{Log}\left[1+e^{i (c+d x)}\right] + i\, \text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right] - i \sqrt{2}\, \text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right) +$$
$$\frac{1}{\left(a (1+\text{Cos}[c+d x])\right)^{7/2}} \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^7 \sqrt{\text{Sec}[c+d x]} \left(\frac{(-247 A+427 B)\, \text{Cos}\left[\frac{d x}{2}\right] \text{Sin}\left[\frac{c}{2}\right]}{12 d} + \frac{8 B\, \text{Cos}\left[\frac{3 d x}{2}\right] \text{Sin}\left[\frac{3 c}{2}\right]}{d} - \right.$$
$$\frac{(247 A-427 B)\, \text{Cos}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]}{12 d} + \frac{\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(379 A\, \text{Sin}\left[\frac{d x}{2}\right] - 703 B\, \text{Sin}\left[\frac{d x}{2}\right]\right)}{24 d} +$$
$$\frac{\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(A\, \text{Sin}\left[\frac{d x}{2}\right] - B\, \text{Sin}\left[\frac{d x}{2}\right]\right)}{3 d} + \frac{\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(-41 A\, \text{Sin}\left[\frac{d x}{2}\right] + 53 B\, \text{Sin}\left[\frac{d x}{2}\right]\right)}{12 d} +$$
$$\left.\frac{8 B\, \text{Cos}\left[\frac{3 c}{2}\right] \text{Sin}\left[\frac{3 d x}{2}\right]}{d} + \frac{(379 A-703 B)\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Tan}\left[\frac{c}{2}\right]}{24 d} - \frac{(41 A-53 B)\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Tan}\left[\frac{c}{2}\right]}{12 d} + \frac{(A-B)\, \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \text{Tan}\left[\frac{c}{2}\right]}{3 d}\right)$$

- **Problem 571: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+B\, \text{Cos}[c+d x]}{(a+b\, \text{Cos}[c+d x])\, \text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 197 leaves, 10 steps):

$$\frac{2\,(A\,b-a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b^2\,d}-\frac{2\,\left(3\,a\,A\,b-3\,a^2\,B-b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,b^3\,d}+\frac{2\,a^2\,(A\,b-a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b^3\,(a+b)\,d}+\frac{2\,B\,\text{Sin}[c+d\,x]}{3\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 548 leaves) :

$$-\frac{1}{6\,b\,d}\left(\left(4\,B\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\,\text{Sin}[c+d\,x]\right)\Big/\left((a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+\left(2\,(-3\,A\,b+a\,B)\,\text{Cos}[c+d\,x]^2\,\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]+\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\right)\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+\left((-3\,A\,b+3\,a\,B)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\left(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\sqrt{1-\text{Sec}[c+d\,x]^2}+4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\sqrt{1-\text{Sec}[c+d\,x]^2}-2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\sqrt{1-\text{Sec}[c+d\,x]^2}\right)\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\right)+\frac{B\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[2\,(c+d\,x)]}{3\,b\,d}$$

- **Problem 573: Result more than twice size of optimal antiderivative.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 316 leaves, 11 steps) :

$$-\frac{\left(2 a^2 A-3 A b^2+a b B\right) \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a^2\left(a^2-b^2\right) d}+\frac{(A b-a B) \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a\left(a^2-b^2\right) d}-\frac{\left(5 a^2 A b-3 A b^3-3 a^3 B+a b^2 B\right) \sqrt{\operatorname{Cos}[c+d x]}\ \operatorname{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a^2(a-b)(a+b)^2 d}+\frac{\left(2 a^2 A-3 A b^2+a b B\right) \sqrt{\operatorname{Sec}[c+d x]}\ \operatorname{Sin}[c+d x]}{a^2\left(a^2-b^2\right) d}+\frac{b(A b-a B) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{a\left(a^2-b^2\right) d(b+a \operatorname{Sec}[c+d x])}$$

Result (type 4, 687 leaves) :

$$-\frac{1}{4 a^2(a-b)(a+b) d}\left(-\left(2\left(4 a^3 A-8 a A b^2+4 a^2 b B\right) \operatorname{Cos}[c+d x]^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right](b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2}\ \operatorname{Sin}[c+d x]\right) \Big/ \left(b(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right)\right)+\left(2\left(10 a^2 A b-9 A b^3-4 a^3 B+3 a b^2 B\right) \operatorname{Cos}[c+d x]^2\left(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]+\operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]\right)(b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2}\ \operatorname{Sin}[c+d x]\right) \Big/ \left(a(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right)\right)+\left(\left(2 a^2 A b-3 A b^3+a b^2 B\right) \operatorname{Cos}[2(c+d x)](b+a \operatorname{Sec}[c+d x])\left(-4 a b+4 a b \operatorname{Sec}[c+d x]^2-4 a b \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+2(2 a-b) b \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+4 a^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}-2 b^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}\right) \operatorname{Sin}[c+d x]\right) \Big/ \left(a b^2(a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right) \sqrt{\operatorname{Sec}[c+d x]}\left(2-\operatorname{Sec}[c+d x]^2\right)\right)\right)+\frac{\sqrt{\operatorname{Sec}[c+d x]}\left(\frac{\left(2 a^2 A-3 A b^2+a b B\right) \operatorname{Sin}[c+d x]}{a^2\left(a^2-b^2\right)}+\frac{A b^2 \operatorname{Sin}[c+d x]-a b B \operatorname{Sin}[c+d x]}{a\left(a^2-b^2\right)(a+b \operatorname{Cos}[c+d x])}\right)}{d}$$

## Problem 574: Result more than twice size of optimal antiderivative.

$$\int \frac{(A+B \operatorname{Cos}[c+d x]) \sqrt{\operatorname{Sec}[c+d x]}}{(a+b \operatorname{Cos}[c+d x])^2}\, dx$$

Optimal (type 4, 260 leaves) :

$$-\frac{(A b-a B)\sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{a\left(a^2-b^2\right) d}-\frac{(A b-a B)\sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{b\left(a^2-b^2\right) d}+\frac{\left(3 a^2 A b-A b^3-a^3 B-a b^2 B\right)\sqrt{\text{Cos}[c+d x]}\ \text{EllipticPi}\left[\frac{2 b}{a+b},\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{a(a-b) b (a+b)^2 d}+\frac{b(A b-a B)\sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{a\left(a^2-b^2\right) d (b+a\,\text{Sec}[c+d x])}$$

Result (type 4, 645 leaves) :

$$\frac{1}{4 a(-a+b)(a+b) d}\Bigg(-\Big(2(4 a A b-4 a^2 B)\text{Cos}[c+d x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big](b+a\,\text{Sec}[c+d x])\sqrt{1-\text{Sec}[c+d x]^2}\ \text{Sin}[c+d x]\Big)\Big/\Big(b(a+b\,\text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\Big)+\Big(2\left(-4 a^2 A+3 A b^2+a b B\right)\text{Cos}[c+d x]^2\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\Big)(b+a\,\text{Sec}[c+d x])\sqrt{1-\text{Sec}[c+d x]^2}\ \text{Sin}[c+d x]\Big)\Big/\Big(a(a+b\,\text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\Big)+\Big(\left(A b^2-a b B\right)\text{Cos}[2(c+d x)](b+a\,\text{Sec}[c+d x])\Big(-4 a b+4 a b\,\text{Sec}[c+d x]^2-4 a b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\sqrt{\text{Sec}[c+d x]}\sqrt{1-\text{Sec}[c+d x]^2}+2(2 a-b) b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\sqrt{\text{Sec}[c+d x]}\sqrt{1-\text{Sec}[c+d x]^2}+4 a^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\sqrt{\text{Sec}[c+d x]}\sqrt{1-\text{Sec}[c+d x]^2}-2 b^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\sqrt{\text{Sec}[c+d x]}\sqrt{1-\text{Sec}[c+d x]^2}\Big)\text{Sin}[c+d x]\Big)\Big/\Big(a b^2(a+b\,\text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\sqrt{\text{Sec}[c+d x]}\left(2-\text{Sec}[c+d x]^2\right)\Big)\Bigg)+\frac{\sqrt{\text{Sec}[c+d x]}\left(-\frac{(-A b+a B)\,\text{Sin}[c+d x]}{a\left(a^2-b^2\right)}+\frac{-A b\,\text{Sin}[c+d x]+a B\,\text{Sin}[c+d x]}{\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d x])}\right)}{d}$$

## Problem 575: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^2\sqrt{\text{Sec}[c+d x]}}\,dx$$

Optimal (type 4, 258 leaves, 10 steps) :

$$\frac{(A b-a B)\sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{b\left(a^2-b^2\right) d}+\frac{\left(a A b+a^2 B-2 b^2 B\right)\sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{b^2\left(a^2-b^2\right) d}-\frac{\left(a^2 A b+A b^3+a^3 B-3 a b^2 B\right)\sqrt{\text{Cos}[c+d x]}\ \text{EllipticPi}\left[\frac{2 b}{a+b},\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{(a-b) b^2(a+b)^2 d}-\frac{(A b-a B)\sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{\left(a^2-b^2\right) d (b+a\,\text{Sec}[c+d x])}$$

Result (type 4, 632 leaves):

$$\frac{1}{4\,(a-b)\,(a+b)\,d}$$

$$\Bigg(-\Bigg(2\,(4\,a\,A-4\,b\,B)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Bigg/$$

$$\Big(b\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\Big)+$$

$$\Bigg(2\,(-A\,b+a\,B)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)$$

$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Bigg/\Big(a\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\Big)+$$

$$\Bigg((A\,b-a\,B)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]$$

$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$

$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$

$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Bigg)\Bigg/$$

$$\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\,\sqrt{\text{Sec}[c+d\,x]}\,\big(2-\text{Sec}[c+d\,x]^2\big)\Big)\Bigg)+$$

$$\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{(A\,b-a\,B)\,\text{Sin}[c+d\,x]}{b\,(-a^2+b^2)}+\frac{-a\,A\,b\,\text{Sin}[c+d\,x]+a^2\,B\,\text{Sin}[c+d\,x]}{b\,(-a^2+b^2)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

## Problem 576: Result more than twice size of optimal antiderivative.

$$\int \frac{A+B\,\text{Cos}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 284 leaves, 10 steps):

$$-\frac{\left(a\,A\,b-3\,a^2\,B+2\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b^2\,\left(a^2-b^2\right)\,d}+$$

$$\frac{\left(a^2\,A\,b-2\,A\,b^3-3\,a^3\,B+4\,a\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b^3\,\left(a^2-b^2\right)\,d}-$$

$$\frac{a\,\left(a^2\,A\,b-3\,A\,b^3-3\,a^3\,B+5\,a\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{(a-b)\,b^3\,(a+b)^2\,d}+\frac{a\,(A\,b-a\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\,(b+a\,\text{Sec}[c+d\,x])}$$

Result (type 4, 661 leaves):

$$\frac{1}{4\,b\,(-a+b)\,(a+b)\,d}\Bigg(-\Big(2\,(4\,A\,b^2-4\,a\,b\,B)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\Big(b\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\Big)+$$

$$\Big(2\,(-a\,A\,b-a^2\,B+2\,b^2\,B)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)$$

$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\Big(a\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\Big)+$$

$$\Big(\Big(a\,A\,b-3\,a^2\,B+2\,b^2\,B\Big)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]$$

$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$

$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$

$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Big)\Big/$$

$$\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\,\sqrt{\text{Sec}[c+d\,x]}\,(2-\text{Sec}[c+d\,x]^2)\Big)\Bigg)+$$

$$\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(-\frac{a\,(-A\,b+a\,B)\,\text{Sin}[c+d\,x]}{b^2\,(a^2-b^2)}+\frac{a^2\,A\,b\,\text{Sin}[c+d\,x]-a^3\,B\,\text{Sin}[c+d\,x]}{b^2\,(-a^2+b^2)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

- **Problem 590: Attempted integration timed out after 120 seconds.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 473 leaves, 7 steps):

$$\frac{1}{105\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(19\,a^2\,A\,b+8\,A\,b^3+63\,a^3\,B-14\,a\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2+a^2\,(25\,A-63\,B)+2\,a\,b\,(3\,A-7\,B)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,\left(25\,a^2\,A-4\,A\,b^2+7\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,a^2\,d}+$$

$$\frac{2\,(A\,b+7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,a\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 1, 1 leaves):

???

## Problem 591: Unable to integrate problem.

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 390 leaves, 6 steps):

$$\frac{1}{15\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,A-2\,A\,b^2+5\,a\,b\,B\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,(9\,a\,A+2\,A\,b-5\,a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,(A\,b+5\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 8, 37 leaves):

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

## Problem 592: Attempted integration timed out after 120 seconds.

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 324 leaves, 5 steps):

$$\frac{1}{3\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,(A\,b+3\,a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,(A-3\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 1, 1 leaves):

???

■ **Problem 595: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;(A+B\,\mathrm{Cos}[c+d\,x])}{\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 533 leaves, 8 steps):

$$-\frac{1}{4\,a\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\;(4\,A\,b+a\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}[c+d\,x]$$
$$\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\;(4\,A\,b+(a+2\,b)\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\;\left(4\,a\,A\,b-a^2\,B+4\,b^2\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticPi}\Big[\frac{a+b}{b},\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{(4\,A\,b+a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1133 leaves):

$$\frac{B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[2\,(c+d\,x)]}{4\,d}+\frac{1}{4\,b\,d\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$
$$\Big(4\,a\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+4\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+a^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+a\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-8\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-$$
$$2\,a\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-4\,a\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+4\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-a^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+a\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-$$

$$8\,a\,A\,b\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;+$$

$$2\,a^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;-$$

$$8\,b^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;-$$

$$8\,a\,A\,b\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;+2\,a^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;-8\,b^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;+$$

$$(a+b)\,(4\,A\,b+a\,B)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;-2\,b\,(4\,a\,A-a\,B+2\,b\,B)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,\right)$$

- **Problem 596: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,(A+B\,\text{Cos}[c+d\,x])}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 620 leaves, 9 steps):

$$-\frac{1}{24\,a\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\,(a+2\,b)\,\,(6\,A\,b-3\,a\,B+8\,b\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{8\,b^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\left(2\,a^2\,A\,b-8\,A\,b^3-a^3\,B-4\,a\,b^2\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{(2\,A\,b-a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+$$

$$\frac{B\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{\left(6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\,\mathrm{Sin}[c+d\,x]}{24\,b^2\,d}$$

Result (type 4, 3687 leaves) :

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\,\left(\frac{1}{12}\,B\,\mathrm{Sin}[c+d\,x]+\frac{(6\,A\,b+a\,B)\,\mathrm{Sin}[2\,(c+d\,x)]}{24\,b}+\frac{1}{12}\,B\,\mathrm{Sin}[3\,(c+d\,x)]\right)}{d}+$$

$$\left(\left(\frac{A\,b}{2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{7\,a\,B}{12\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{3\,a\,A\,\sqrt{\mathrm{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{a^2\,B\,\sqrt{\mathrm{Sec}[c+d\,x]}}{48\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.\right.$$

$$\left.\frac{b\,B\,\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,A\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{a^2\,B\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{b\,B\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right)$$

$$\left(\frac{\left(6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B\right)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{24\,b^2\,\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}+\right.$$

$$\left(\left((a+b)\,\left(-6\,a\,A\,b+3\,a^2\,B-16\,b^2\,B\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\,\left(-6\,a\,A\,b+12\,A\,b^2-a^2\,B+14\,a\,b\,B\right)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+6\,\left(-2\,a^2\,A\,b+8\,A\,b^3+a^3\,B+4\,a\,b^2\,B\right)$$

$$\left.\left.\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)\Big/$$

$$\left.\left.\left(24\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\right)\Big/$$

$$\left(d\,\left(\frac{\left(6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B\right)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{48\,b^2\,\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}-\right.\right.$$

$$\left(\left((a+b)\,\left(-6\,a\,A\,b+3\,a^2\,B-16\,b^2\,B\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+2\,b\,\left(-6\,a\,A\,b+12\,A\,b^2-a^2\,B+14\,a\,b\,B\right)\,\mathrm{EllipticF}\right[\right.$$

$$\left.\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+6\,\left(-2\,a^2\,A\,b+8\,A\,b^3+a^3\,B+4\,a\,b^2\,B\right)\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^3 \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\Bigg/\Bigg(24 b^2 (a+b)$$

$$\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg)-$$

$$\Bigg(\Bigg((a+b)\left(-6 a A b+3 a^2 B-16 b^2 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+2 b\left(-6 a A b+12 A b^2-a^2 B+14 a b B\right) \text{EllipticF}\Big[$$

$$\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\Big]+6\left(-2 a^2 A b+8 A b^3+a^3 B+4 a b^2 B\right) \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]\Bigg)$$

$$\left(a \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]-b \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)$$

$$\sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg)\Bigg/$$

$$\left(48 b^2 (a+b)^2 \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\left(\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}\right)^{3/2}\right)-$$

$$\Bigg(\Bigg((a+b)\left(-6 a A b+3 a^2 B-16 b^2 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+2 b\left(-6 a A b+12 A b^2-a^2 B+14 a b B\right) \text{EllipticF}\Big[$$

$$\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\Big]+6\left(-2 a^2 A b+8 A b^3+a^3 B+4 a b^2 B\right) \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]\Bigg)$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg)\Bigg/$$

$$\left(24 b^2 (a+b) \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2 \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)-$$

$$\Big(\Big((a+b)\,(-6\,a\,A\,b+3\,a^2\,B-16\,b^2\,B)\,\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+2\,b\,(-6\,a\,A\,b+12\,A\,b^2-a^2\,B+14\,a\,b\,B)\,\text{EllipticF}\Big[$$

$$\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+6\,(-2\,a^2\,A\,b+8\,A\,b^3+a^3\,B+4\,a\,b^2\,B)\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\Big)$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\sqrt{\frac{1}{1-\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}\,\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4}\Big)\Big/$$

$$\Big(48\,b^2\,(a+b)\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^2\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}\Big)-$$

$$\Big((6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}$$

$$\Big(\frac{\text{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]}{1-\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}+\frac{\text{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]\,\big(1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)}{\big(1-\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)^2}\Big)\Big)\Big/\Big(48\,b^2\,\Big(\frac{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{1-\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\Big)^{3/2}\Big)+$$

$$\Big((6\,a\,A\,b-3\,a^2\,B+16\,b^2\,B)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\Big(\frac{a\,\text{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]-b\,\text{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}-$$

$$\frac{\text{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]\,\big(a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)}{\big(1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\big)^2}\Big)\Big)\Big/$$

$$\Big(48\,b^2\,\sqrt{\frac{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{1-\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}\Big)+$$

$$\Big(\Big((a+b)\,(-6\,a\,A\,b+3\,a^2\,B-16\,b^2\,B)\,\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+2\,b\,(-6\,a\,A\,b+12\,A\,b^2-a^2\,B+14\,a\,b\,B)\,\text{EllipticF}\Big[$$

$$\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+6\,(-2\,a^2\,A\,b+8\,A\,b^3+a^3\,B+4\,a\,b^2\,B)\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\Big)$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\left(\frac{a\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}-\frac{\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)}{\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\right)\Bigg)\Bigg/$$

$$\left(48\,b^2\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right.$$

$$\left.\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)+\left(\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\right.$$

$$\left(\frac{b\left(-6\,a\,A\,b+12\,A\,b^2-a^2\,B+14\,a\,b\,B\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}-\frac{3\left(-2\,a^2\,A\,b+8\,A\,b^3+a^3\,B+4\,a\,b^2\,B\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+\right.$$

$$\left.\left.\frac{(a+b)\left(-6\,a\,A\,b+3\,a^2\,B-16\,b^2\,B\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}{2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)\right)\Bigg/$$

$$\left.\left.\left(24\,b^2\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\right)\right)$$

- **Problem 597: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 562 leaves, 8 steps) :

$$\frac{1}{315\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(147\,a^4\,A+33\,a^2\,A\,b^2+8\,A\,b^4+246\,a^3\,b\,B-18\,a\,b^3\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{315\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^3-a^3\,(147\,A-75\,B)+3\,a^2\,b\,(13\,A-57\,B)+6\,a\,b^2\,(A-3\,B)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{2\,\left(88\,a^2\,A\,b-4\,A\,b^3+75\,a^3\,B+9\,a\,b^2\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,a^2\,d}+$$

$$\frac{2\,\left(49\,a^2\,A+3\,A\,b^2+72\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{315\,a\,d}+$$

$$\frac{2\,(10\,A\,b+9\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,d}+\frac{2\,a\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 598: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 473 leaves, 7 steps):

$$\frac{1}{105\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(82\,a^2\,A\,b-6\,A\,b^3+63\,a^3\,B+21\,a\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{105\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(6\,A\,b^2-a^2\,(25\,A-63\,B)+3\,a\,b\,(19\,A-7\,B)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{2\,\left(25\,a^2\,A+3\,A\,b^2+42\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,a\,d}+\frac{2\,(8\,A\,b+7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,d}+\frac{2\,a\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 599: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 393 leaves, 6 steps):

$$\frac{1}{15\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,A+3\,A\,b^2+20\,a\,b\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{15\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\,(9\,a\,A-3\,A\,b-5\,a\,B+15\,b\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{2\,(6\,A\,b+5\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,a\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 602: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 532 leaves, 8 steps):

$$-\frac{1}{4\,a\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,(4\,A\,b+5\,a\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,(8\,a\,A+4\,A\,b+5\,a\,B+2\,b\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(12\,a\,A\,b+3\,a^2\,B+4\,b^2\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\Big[\frac{a+b}{b},\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{b\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{(4\,A\,b+5\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d}$$

Result (type 4, 1146 leaves):

$$\frac{b\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[2\,(c+d\,x)]}{4\,d}+\frac{1}{4\,d\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$
$$\Bigg(4\,a\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+4\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+5\,a^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+5\,a\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-8\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-$$
$$10\,a\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-4\,a\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+4\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-5\,a^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+5\,a\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-$$
$$24\,a\,A\,b\,\mathrm{EllipticPi}\Big[-1,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$
$$6\,a^2\,B\,\mathrm{EllipticPi}\Big[-1,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$8\,b^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-$$

$$24\,a\,A\,b\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-6\,a^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-8\,b^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+$$

$$(a+b)\,(4\,A\,b+5\,a\,B)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+2\,\left(4\,a^2\,(A-B)-2\,b^2\,B+a\,b\,(-8\,A+B)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 603: Result more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,(A+B\,\text{Cos}[c+d\,x])}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 626 leaves, 9 steps) :

$$-\frac{1}{24\,a\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(30\,a\,A\,b+3\,a^2\,B+16\,b^2\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{24\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(30\,a\,A\,b+12\,A\,b^2+3\,a^2\,B+14\,a\,b\,B+16\,b^2\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\left(6\,a^2\,A\,b+8\,A\,b^3-a^3\,B+12\,a\,b^2\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{b\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Sec}[c+d\,x]^{3/2}}+$$

$$\frac{(6\,A\,b+7\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{\left(30\,a\,A\,b+3\,a^2\,B+16\,b^2\,B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{24\,b\,d}$$

Result (type 4, 1505 leaves):

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(\frac{1}{12}\,b\,B\,\mathrm{Sin}[c+d\,x]+\frac{1}{24}\,(6\,A\,b+7\,a\,B)\,\mathrm{Sin}[2\,(c+d\,x)]+\frac{1}{12}\,b\,B\,\mathrm{Sin}[3\,(c+d\,x)]\right)+$$

$$\frac{1}{24\,b\,d\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(30\,a^2\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+30\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^3\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+16\,a\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$16\,b^3\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-60\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-6\,a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-32\,b^3\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-30\,a^2\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$30\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-3\,a^3\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-16\,a\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+16\,b^3\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$36\, a^2\, A\, b\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, -$$

$$48\, A\, b^3\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, +$$

$$6\, a^3\, B\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, -$$

$$72\, a\, b^2\, B\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, -$$

$$36\, a^2\, A\, b\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}$$

$$\sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, -48\, A\, b^3\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, +6\, a^3\, B\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, -$$

$$72\, a\, b^2\, B\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}$$

$$\sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, +(a+b)\, \left(30\, a\, A\, b+3\, a^2\, B+16\, b^2\, B\right)\, \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}\, \left(1+\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2\right) \sqrt{\frac{a+b+a\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2-b\, \text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a+b}}\, -$$

$$2\, b\, \left(12\, A\, b^2+a^2\, (24\, A-7\, B)+a\, (-6\, A\, b+26\, b\, B)\right)\, \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\, (c+d\, x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\;\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\;\Bigg)$$

## Problem 604: Result more than twice size of optimal antiderivative.

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 730 leaves, 10 steps):

$$-\frac{1}{192\,a\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\,\left(24\,a^2\,A\,b+128\,A\,b^3-9\,a^3\,B+156\,a\,b^2\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{192\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(9\,a^3\,B-6\,a^2\,b\,(4\,A+B)-8\,b^3\,(16\,A+9\,B)-4\,a\,b^2\,(28\,A+39\,B)\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$
$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{64\,b^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(8\,a^3\,A\,b-96\,a\,A\,b^3-3\,a^4\,B-24\,a^2\,b^2\,B-48\,b^4\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$
$$\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{\left(8\,a\,A\,b-3\,a^2\,B+12\,b^2\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{32\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{(8\,A\,b-3\,a\,B)\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+$$
$$\frac{B\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{\left(24\,a^2\,A\,b+128\,A\,b^3-9\,a^3\,B+156\,a\,b^2\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{192\,b^2\,d}$$

Result (type 4, 1907 leaves):

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}$$
$$\left(\frac{1}{96}(8\,A\,b+9\,a\,B)\,\mathrm{Sin}[c+d\,x]+\frac{\left(56\,a\,A\,b+3\,a^2\,B+48\,b^2\,B\right)\mathrm{Sin}[2\,(c+d\,x)]}{192\,b}+\frac{1}{96}(8\,A\,b+9\,a\,B)\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{32}\,b\,B\,\mathrm{Sin}[4\,(c+d\,x)]\right)+$$

$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\left(-24a^3Ab\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-24a^2Ab^2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-\right.\right.$$

$$128aAb^3\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-128Ab^4\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]+9a^4B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]+9a^3bB\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-156a^2b^2B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$

$$156ab^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]+48a^2Ab^2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3+256Ab^4\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3-18a^3bB\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3+$$

$$312ab^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3+24a^3Ab\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-24a^2Ab^2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+128aAb^3\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-$$

$$128Ab^4\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-9a^4B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+9a^3bB\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+156a^2b^2B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-156ab^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-$$

$$48a^3Ab\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$576aAb^3\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$18a^4B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$144a^2b^2B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$288b^4B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}-$$

$$48a^3Ab\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+576aAb^3\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+18a^4B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$144\,a^2\,b^2\,B\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+288\,b^4\,B\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$(a+b)\left(-24\,a^2\,A\,b-128\,A\,b^3+9\,a^3\,B-156\,a\,b^2\,B\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}-$$

$$2\,b\left(2\,a^2\,b\,(28\,A-57\,B)-4\,a\,b^2\,(52\,A-9\,B)+3\,a^3\,B-72\,b^3\,B\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(192\,b^2\,d\sqrt{1+\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\left(b\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)-a\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)\right)$$

- **Problem 605: Attempted integration timed out after 120 seconds.**

$$\int(a+b\,\mathrm{Cos}[c+dx])^{5/2}\,(A+B\,\mathrm{Cos}[c+dx])\,\mathrm{Sec}[c+dx]^{13/2}\,dx$$

Optimal (type 4, 662 leaves, 9 steps):

$$\frac{1}{3465\, a^4\, d\, \sqrt{\mathrm{Sec}[c+d\,x]}} 2\,(a-b)\,\sqrt{a+b}\,\left(3705\, a^4\, A\, b + 255\, a^2\, A\, b^3 + 40\, A\, b^5 + 1617\, a^5\, B + 3069\, a^3\, b^2\, B - 110\, a\, b^4\, B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}} + \frac{1}{3465\, a^3\, d\, \sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(40\, A\, b^4 + 3\, a^4\,(225\, A - 539\, B) - 6\, a^3\, b\,(505\, A - 209\, B) + 15\, a^2\, b^2\,(19\, A - 121\, B) + 10\, a\, b^3\,(3\, A - 11\, B)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{2\,\left(675\, a^4\, A + 1025\, a^2\, A\, b^2 - 20\, A\, b^4 + 1793\, a^3\, b\, B + 55\, a\, b^3\, B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3465\, a^2\, d} +$$

$$\frac{2\,\left(1145\, a^2\, A\, b + 15\, A\, b^3 + 539\, a^3\, B + 825\, a\, b^2\, B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{3465\, a\, d} +$$

$$\frac{2\,\left(81\, a^2\, A + 113\, A\, b^2 + 209\, a\, b\, B\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{693\, d} +$$

$$\frac{2\, a\,(14\, A\, b + 11\, a\, B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sec}[c+d\,x]^{9/2}\,\mathrm{Sin}[c+d\,x]}{99\, d} + \frac{2\, a\, A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{11/2}\,\mathrm{Sin}[c+d\,x]}{11\, d}$$

Result (type 1, 1 leaves) :

???

- **Problem 606: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 562 leaves, 8 steps) :

$$\frac{1}{315\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(147\,a^4\,A+279\,a^2\,A\,b^2-10\,A\,b^4+435\,a^3\,b\,B+45\,a\,b^3\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{315\,a^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^3-6\,a^2\,b\,(19\,A-60\,B)+3\,a^3\,(49\,A-25\,B)+15\,a\,b^2\,(11\,A-3\,B)\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{2\,\left(163\,a^2\,A\,b+5\,A\,b^3+75\,a^3\,B+135\,a\,b^2\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{315\,a\,d}+$$

$$\frac{2\,\left(49\,a^2\,A+75\,A\,b^2+135\,a\,b\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{315\,d}+$$

$$\frac{2\,a\,(4\,A\,b+3\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{9/2}\,\mathrm{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 607: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 474 leaves, 7 steps) :

$$\frac{1}{105\, a^2\, d\, \sqrt{\text{Sec}[c+d\,x]}} 2\,(a-b)\,\sqrt{a+b}\,\left(145\, a^2\, A\, b + 15\, A\, b^3 + 63\, a^3\, B + 161\, a\, b^2\, B\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{1}{105\, a\, d\, \sqrt{\text{Sec}[c+d\,x]}} 2\,(a-b)\,\sqrt{a+b}\,\left(a^2\,(25\,A-63\,B) + 15\, b^2\,(A-7\,B) - 8\,a\,b\,(15\,A-7\,B)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{2\left(25\, a^2\, A + 45\, A\, b^2 + 77\, a\, b\, B\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\, d} +$$

$$\frac{2\,a\,(10\,A\,b+7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\, d} + \frac{2\,a\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\, d}$$

Result (type 1, 1 leaves) :

???

- **Problem 610: Result more than twice size of optimal antiderivative.**

$$\int (a + b\,\text{Cos}[c+d\,x])^{5/2}\,(A + B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 607 leaves, 9 steps) :

$$\frac{1}{4\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(8\,a^2\,A-4\,A\,b^2-9\,a\,b\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(8\,a^2\,(A-B)-2\,b^2\,(2\,A+B)-3\,a\,b\,(8\,A+3\,B)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\left(20\,a\,A\,b+15\,a^2\,B+4\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{b\,(4\,a\,A-b\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\,-$$

$$\frac{\left(8\,a^2\,A-4\,A\,b^2-9\,a\,b\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{4\,d}+\frac{2\,a\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{d}$$

Result (type 4, 1290 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}\,\,\left(2\,a^2\,A\,\text{Sin}[c+d\,x]+\frac{1}{4}\,b^2\,B\,\text{Sin}[2\,(c+d\,x)]\right)}{d}\,+$$

$$\frac{1}{4\,d\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(-8\,a^3\,A\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-8\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+4\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+4\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$9\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+16\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-8\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-18\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+8\,a^3\,A\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$8\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-4\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+4\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-9\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+9\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$40\,a\,A\,b^2\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$30\,a^2\,b\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$8\,b^3\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$40\,a\,A\,b^2\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-30\,a^2\,b\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$8\,b^3\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-(a+b)\left(8\,a^2\,A-4\,A\,b^2-9\,a\,b\,B\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$2\left(12\,a^2\,b\,(A-B)-2\,b^3\,B+a\,b^2\,(-12\,A+B)+4\,a^3\,(A+B)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 611: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,(A+B\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 624 leaves, 9 steps) :

$$-\frac{1}{24\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(54\,a\,A\,b+33\,a^2\,B+16\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(4\,b^2\,(3\,A+4\,B)+a^2\,(48\,A+33\,B)+a\,(54\,A\,b+26\,b\,B)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(30\,a^2\,A\,b+8\,A\,b^3+5\,a^3\,B+20\,a\,b^2\,B\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{b\,(2\,A\,b+3\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{b\,B\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{\left(54\,a\,A\,b+33\,a^2\,B+16\,b^2\,B\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d}$$

Result (type 4, 1521 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{1}{12}\,b^2\,B\,\text{Sin}[c+d\,x]+\frac{1}{24}\,b\,(6\,A\,b+13\,a\,B)\,\text{Sin}[2\,(c+d\,x)]+\frac{1}{12}\,b^2\,B\,\text{Sin}[3\,(c+d\,x)]\right)-\frac{1}{24\,d\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\left(-54\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-54\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-33\,a^3\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-33\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-16\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-16\,b^3\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+108\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+66\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+32\,b^3\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+54\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-54\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+33\,a^3\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-33\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+16\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-16\,b^3\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+\right.$$

$$180\, a^2 A\, b\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} +$$

$$48\, A\, b^3\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} +$$

$$30\, a^3\, B\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} +$$

$$120\, a\, b^2\, B\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} +$$

$$180\, a^2 A\, b\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} + 48\, A\, b^3\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} + 30\, a^3\, B\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} +$$

$$120\, a\, b^2\, B\, \text{EllipticPi}\left[-1,\, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} - (a+b)\left(54\, a\, A\, b + 33\, a^2\, B + 16\, b^2\, B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\, \left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}} -$$

$$2\left(-12\, A\, b^3 + 2\, a\, b^2\,(3\, A - 19\, B) + 24\, a^3\,(A - B) + a^2\,(-72\, A\, b + 13\, b\, B)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\, \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\;\Bigg)$$

- **Problem 612: Result more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d x])^{5/2}\,(A+B\,\text{Cos}[c+d x])}{\sqrt{\text{Sec}[c+d x]}}\,dx$$

Optimal (type 4, 724 leaves, 10 steps):

$$-\frac{1}{192\,a\,b\,d\sqrt{\text{Sec}[c+d x]}}(a-b)\sqrt{a+b}\left(264 a^2 A b+128 A b^3+15 a^3 B+284 a b^2 B\right)\sqrt{\text{Cos}[c+d x]}$$
$$\text{Csc}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{1}{192\,b\,d\sqrt{\text{Sec}[c+d x]}}\sqrt{a+b}\left(15 a^3 B+8 b^3(16 A+9 B)+2 a^2 b(132 A+59 B)+4 a b^2(52 A+71 B)\right)\sqrt{\text{Cos}[c+d x]}$$
$$\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}-$$
$$\frac{1}{64\,b^2\,d\sqrt{\text{Sec}[c+d x]}}\sqrt{a+b}\left(40 a^3 A b+160 a A b^3-5 a^4 B+120 a^2 b^2 B+48 b^4 B\right)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]$$
$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{b B(a+b\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{4 d\,\text{Sec}[c+d x]^{3/2}}+\frac{\left(24 a A b+5 a^2 B+12 b^2 B\right)\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{32 d\sqrt{\text{Sec}[c+d x]}}+$$
$$\frac{(8 A b+11 a B)(a+b\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{24 d\sqrt{\text{Sec}[c+d x]}}+\frac{\left(264 a^2 A b+128 A b^3+15 a^3 B+284 a b^2 B\right)\sqrt{a+b\,\text{Cos}[c+d x]}\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{192\,b\,d}$$

Result (type 4, 1877 leaves):

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d x]}\sqrt{\text{Sec}[c+d x]}\left(\frac{1}{96}b(8 A b+17 a B)\,\text{Sin}[c+d x]+\right.$$
$$\left.\frac{1}{192}\left(104 a A b+59 a^2 B+48 b^2 B\right)\text{Sin}[2(c+d x)]+\frac{1}{96}b(8 A b+17 a B)\,\text{Sin}[3(c+d x)]+\frac{1}{32}b^2 B\,\text{Sin}[4(c+d x)]\right)+$$

$$\frac{1}{192\, b\, d\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}$$

$$\Bigg(264\, a^3 A\, b\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+264\, a^2 A\, b^2\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+128\, a\, A\, b^3\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+128\, A\, b^4\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+15\, a^4 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$15\, a^3 b\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+284\, a^2 b^2 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+284\, a\, b^3 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-528\, a^2 A\, b^2\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-$$

$$256\, A\, b^4\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-30\, a^3 b\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-568\, a\, b^3 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-264\, a^3 A\, b\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$264\, a^2 A\, b^2\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-128\, a\, A\, b^3\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+128\, A\, b^4\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-15\, a^4 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$15\, a^3 b\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-284\, a^2 b^2 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+284\, a\, b^3 B\, \mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-$$

$$240\, a^3 A\, b\, \mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$960\, a\, A\, b^3\, \mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$30\, a^4 B\, \mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$720\, a^2 b^2 B\, \mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$288\, b^4 B\, \mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$240\, a^3 A\, b\, \mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-960\,a\,A\,b^3\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+30\,a^4\,B\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$720\,a^2\,b^2\,B\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-288\,b^4\,B\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$(a+b)\left(264\,a^2\,A\,b+128\,A\,b^3+15\,a^3\,B+284\,a\,b^2\,B\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$2\,b\left(a^3\,(192\,A-59\,B)+4\,a\,b^2\,(76\,A-9\,B)+72\,b^3\,B+a^2\,(-104\,A\,b+322\,b\,B)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 613: Result more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cos}[c+d\,x])}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 839 leaves, 11 steps):

$$-\frac{1}{1920\,a\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\,\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{1920\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(45\,a^4\,B-30\,a^3\,b\,(5\,A+B)-16\,b^4\,(45\,A+64\,B)-8\,a\,b^3\,(355\,A+193\,B)-4\,a^2\,b^2\,(295\,A+423\,B)\right)$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{128\,b^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(10\,a^4\,A\,b-240\,a^2\,A\,b^3-96\,A\,b^5-3\,a^5\,B-40\,a^3\,b^2\,B-240\,a\,b^4\,B\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(50\,a^2\,A\,b+120\,A\,b^3-15\,a^3\,B+172\,a\,b^2\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{320\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{\left(50\,a\,A\,b-15\,a^2\,B+64\,b^2\,B\right)(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{240\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+$$

$$\frac{(10\,A\,b-3\,a\,B)\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{40\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{B\,(a+b\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sin}[c+d\,x]}{5\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{1}{1920\,b^2\,d}$$

$$\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]$$

Result (type 4, 4552 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{1}{960}\left(170\,a\,A\,b+93\,a^2\,B+88\,b^2\,B\right)\mathrm{Sin}[c+d\,x]+\frac{\left(590\,a^2\,A\,b+480\,A\,b^3+15\,a^3\,B+1024\,a\,b^2\,B\right)\mathrm{Sin}[2\,(c+d\,x)]}{1920\,b}+\right.$$

$$\left.\frac{1}{960}\left(170\,a\,A\,b+93\,a^2\,B+100\,b^2\,B\right)\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{320}\,b\,(10\,A\,b+21\,a\,B)\,\mathrm{Sin}[4\,(c+d\,x)]+\frac{1}{80}\,b^2\,B\,\mathrm{Sin}[5\,(c+d\,x)]\right)+$$

$$\left(\left(\frac{161\,a^2\,A\,b}{96\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{3\,A\,b^3}{8\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{191\,a^3\,B}{320\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\right.\right.$$

$$\frac{289\,a\,b^2\,B}{240\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{133\,a^3\,A\,\sqrt{\mathrm{Sec}[c+d\,x]}}{384\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{89\,a\,A\,b^2\,\sqrt{\mathrm{Sec}[c+d\,x]}}{96\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{a^4\,B\,\sqrt{\mathrm{Sec}[c+d\,x]}}{256\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{809\,a^2\,b\,B\,\sqrt{\mathrm{Sec}[c+d\,x]}}{960\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{4\,b^3\,B\,\sqrt{\mathrm{Sec}[c+d\,x]}}{15\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{5\,a^3\,A\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{128\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{71\,a\,A\,b^2\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{96\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{3\,a^4\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{256\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{141\,a^2\,b\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{320\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{4\,b^3\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{15\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\Bigg)$$

$$\Bigg(\Bigg(\Bigg(\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\Bigg)\Bigg/$$

$$\left(1920\,b^2\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)+$$

$$\Bigg(\Bigg((a+b)\,\left(-150\,a^3\,A\,b-2840\,a\,A\,b^3+45\,a^4\,B-1692\,a^2\,b^2\,B-1024\,b^4\,B\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$2\,b\,\left(720\,A\,b^4-8\,a\,b^3\,(45\,A-289\,B)+4\,a^2\,b^2\,(805\,A-193\,B)-15\,a^4\,B+a^3\,(-590\,A\,b+1146\,b\,B)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\right.$$

$$\left.\frac{-a+b}{a+b}\right]+30\,\left(-10\,a^4\,A\,b+240\,a^2\,A\,b^3+96\,A\,b^5+3\,a^5\,B+40\,a^3\,b^2\,B+240\,a\,b^4\,B\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(1920\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(d\,\Bigg(\Bigg(\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\Bigg)\Bigg/$$

$$\left(3840\,b^2\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)-$$

$$\Bigg(\Bigg((a+b)\left(-150 a^3 A b-2840 a A b^3+45 a^4 B-1692 a^2 b^2 B-1024 b^4 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$2 b\left(720 A b^4-8 a b^3 (45 A-289 B)+4 a^2 b^2 (805 A-193 B)-15 a^4 B+a^3 (-590 A b+1146 b B)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\right.$$

$$\left.\frac{-a+b}{a+b}\right]+30\left(-10 a^4 A b+240 a^2 A b^3+96 A b^5+3 a^5 B+40 a^3 b^2 B+240 a b^4 B\right) \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\Bigg)$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^3 \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\Bigg) \Big/ \Bigg(1920 b^2 (a+b)$$

$$\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg)-$$

$$\Bigg(\Bigg((a+b)\left(-150 a^3 A b-2840 a A b^3+45 a^4 B-1692 a^2 b^2 B-1024 b^4 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$2 b\left(720 A b^4-8 a b^3 (45 A-289 B)+4 a^2 b^2 (805 A-193 B)-15 a^4 B+a^3 (-590 A b+1146 b B)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\right.$$

$$\left.\frac{-a+b}{a+b}\right]+30\left(-10 a^4 A b+240 a^2 A b^3+96 A b^5+3 a^5 B+40 a^3 b^2 B+240 a b^4 B\right) \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\Bigg)$$

$$\left(a \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]-b \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)$$

$$\sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg) \Big/$$

$$\left(3840 b^2 (a+b)^2 \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\left(\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}\right)^{3/2}\right)-$$

$$\Bigg(\Bigg((a+b)\left(-150 a^3 A b-2840 a A b^3+45 a^4 B-1692 a^2 b^2 B-1024 b^4 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$2\,b\,\left(720\,A\,b^4-8\,a\,b^3\,(45\,A-289\,B)+4\,a^2\,b^2\,(805\,A-193\,B)-15\,a^4\,B+a^3\,(-590\,A\,b+1146\,b\,B)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+30\,\left(-10\,a^4\,A\,b+240\,a^2\,A\,b^3+96\,A\,b^5+3\,a^5\,B+40\,a^3\,b^2\,B+240\,a\,b^4\,B\right)\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\Bigg)$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(1920\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)-$$

$$\Bigg(\Bigg((a+b)\,\left(-150\,a^3\,A\,b-2840\,a\,A\,b^3+45\,a^4\,B-1692\,a^2\,b^2\,B-1024\,b^4\,B\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$2\,b\,\left(720\,A\,b^4-8\,a\,b^3\,(45\,A-289\,B)+4\,a^2\,b^2\,(805\,A-193\,B)-15\,a^4\,B+a^3\,(-590\,A\,b+1146\,b\,B)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+30\,\left(-10\,a^4\,A\,b+240\,a^2\,A\,b^3+96\,A\,b^5+3\,a^5\,B+40\,a^3\,b^2\,B+240\,a\,b^4\,B\right)\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\Bigg)$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(3840\,b^2\,(a+b)\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)-$$

$$\Bigg(\left(150\,a^3\,A\,b+2840\,a\,A\,b^3-45\,a^4\,B+1692\,a^2\,b^2\,B+1024\,b^4\,B\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(\frac{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}+\frac{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\right)\Bigg)\Bigg/$$

$$\left(3840\, b^2 \left(\frac{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{3/2}\right) + \left(\left(150\, a^3 A\, b + 2840\, a\, A\, b^3 - 45\, a^4 B + 1692\, a^2 b^2 B + 1024\, b^4 B\right) \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right.$$

$$\left(\frac{a\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d\,x)\right] - b\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} - \right.$$

$$\left.\left.\frac{\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d\,x)\right] \left(a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\right)\right) \Big/$$

$$\left(3840\, b^2 \sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right) +$$

$$\left(\left((a+b)\left(-150\, a^3 A\, b - 2840\, a\, A\, b^3 + 45\, a^4 B - 1692\, a^2 b^2 B - 1024\, b^4 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] + \right.\right.$$

$$2\, b \left(720\, A\, b^4 - 8\, a\, b^3 (45\, A - 289\, B) + 4\, a^2 b^2 (805\, A - 193\, B) - 15\, a^4 B + a^3 (-590\, A\, b + 1146\, b\, B)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\right.$$

$$\left.\left.\frac{-a+b}{a+b}\right] + 30\left(-10\, a^4 A\, b + 240\, a^2 A\, b^3 + 96\, A\, b^5 + 3\, a^5 B + 40\, a^3 b^2 B + 240\, a\, b^4 B\right) \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]\right)$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4} \left(\frac{a\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d\,x)\right] - b\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} - \right.$$

$$\left.\left.\frac{\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d\,x)\right] \left(a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\right)\right) \Big/ \left(3840\, b^2 (a+b) \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right.$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right) +$$

$$\left(\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}} \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4} \left(\left(b\left(720\, A\, b^4 - 8\, a\, b^3 (45\, A - 289\, B) + 4\, a^2 b^2 (805\, A - 193\, B) - \right.\right.\right.\right.$$

$$15\,a^4\,B+a^3\,(-590\,A\,b+1146\,b\,B)\Big)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Bigg/\left(\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)-$$

$$\frac{15\,\left(-10\,a^4\,A\,b+240\,a^2\,A\,b^3+96\,A\,b^5+3\,a^5\,B+40\,a^3\,b^2\,B+240\,a\,b^4\,B\right)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+\Big((a+b)\,\left(-150\,a^3\,A\,b-2840\,a\,A\,b^3+\right.$$

$$\left.45\,a^4\,B-1692\,a^2\,b^2\,B-1024\,b^4\,B\right)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\Bigg)\Bigg/\left(2\,\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)\Bigg)\Bigg)\Bigg/$$

$$\left(1920\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\Bigg)\Bigg)$$

## Problem 614: Unable to integrate problem.

$$\int \frac{(A+B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]^{7/2}}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 403 leaves, 6 steps):

$$\frac{1}{15\,a^4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,A+8\,A\,b^2-10\,a\,b\,B\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{15\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,\left(8\,A\,b^2+a^2\,(9\,A-5\,B)-2\,a\,b\,(A+5\,B)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{2\,(4\,A\,b-5\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{15\,a^2\,d}+\frac{2\,A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,a\,d}$$

Result (type 8, 37 leaves):

$$\int \frac{(A+B\operatorname{Cos}[c+d x])\operatorname{Sec}[c+d x]^{7/2}}{\sqrt{a+b\operatorname{Cos}[c+d x]}}\,dx$$

## Problem 615: Unable to integrate problem.

$$\int \frac{(A+B\operatorname{Cos}[c+d x])\operatorname{Sec}[c+d x]^{5/2}}{\sqrt{a+b\operatorname{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 330 leaves, 5 steps):

$$-\frac{1}{3 a^3 d\sqrt{\operatorname{Sec}[c+d x]}}2(a-b)\sqrt{a+b}\,(2 A b-3 a B)\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Csc}[c+d x]$$
$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{1}{3 a^2 d\sqrt{\operatorname{Sec}[c+d x]}}$$
$$2\sqrt{a+b}\,(2 A b+a(A-3 B))\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Csc}[c+d x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{2 A\sqrt{a+b\operatorname{Cos}[c+d x]}\operatorname{Sec}[c+d x]^{3/2}\operatorname{Sin}[c+d x]}{3 a d}$$

Result (type 8, 37 leaves):

$$\int \frac{(A+B\operatorname{Cos}[c+d x])\operatorname{Sec}[c+d x]^{5/2}}{\sqrt{a+b\operatorname{Cos}[c+d x]}}\,dx$$

## Problem 616: Unable to integrate problem.

$$\int \frac{(A+B\operatorname{Cos}[c+d x])\operatorname{Sec}[c+d x]^{3/2}}{\sqrt{a+b\operatorname{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 270 leaves, 4 steps):

$$\frac{1}{a^2 d\sqrt{\operatorname{Sec}[c+d x]}}2 A(a-b)\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Csc}[c+d x]$$
$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}-\frac{1}{a d\sqrt{\operatorname{Sec}[c+d x]}}$$
$$2\sqrt{a+b}\,(A-B)\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Csc}[c+d x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}$$

Result (type 8, 37 leaves):

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^{3/2}}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

## Problem 618: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{A + B \operatorname{Cos}[c + d x]}{\sqrt{a + b \operatorname{Cos}[c + d x]} \sqrt{\operatorname{Sec}[c + d x]}} \, dx$$

Optimal (type 4, 487 leaves, 8 steps):

$$-\frac{1}{a b d \sqrt{\operatorname{Sec}[c + d x]}} (a - b) \sqrt{a + b} B \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x]$$
$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right] \sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}} + \frac{1}{b d \sqrt{\operatorname{Sec}[c + d x]}}$$
$$\sqrt{a + b} B \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right] \sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}} -$$
$$\frac{1}{b^2 d \sqrt{\operatorname{Sec}[c + d x]}} \sqrt{a + b} (2 A b - a B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x] \operatorname{EllipticPi}\left[\frac{a + b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right]$$
$$\sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}} + \frac{B \operatorname{Sin}[c + d x]}{d \sqrt{a + b \operatorname{Cos}[c + d x]} \sqrt{\operatorname{Sec}[c + d x]}} + \frac{a B \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{b d \sqrt{a + b \operatorname{Cos}[c + d x]}}$$

Result (type 4, 1091 leaves):

$$\left(\sqrt{\frac{a + b + a \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^2 - b \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^2}{1 + \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^2}}\right.$$
$$\left(a \sqrt{\frac{a - b}{a + b}} B \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right] + b \sqrt{\frac{a - b}{a + b}} B \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right] - 2 b \sqrt{\frac{a - b}{a + b}} B \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^3 - a \sqrt{\frac{a - b}{a + b}} B \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^5 + \right.$$
$$b \sqrt{\frac{a - b}{a + b}} B \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^5 - 4 i A b \operatorname{EllipticPi}\left[\frac{a + b}{a - b}, i \operatorname{ArcSinh}\left[\sqrt{\frac{a - b}{a + b}} \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]\right], -\frac{a + b}{a - b}\right] \sqrt{1 - \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^2}$$
$$\sqrt{\frac{a + b + a \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^2 - b \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]^2}{a + b}} + 2 i a B \operatorname{EllipticPi}\left[\frac{a + b}{a - b}, i \operatorname{ArcSinh}\left[\sqrt{\frac{a - b}{a + b}} \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]\right], -\frac{a + b}{a - b}\right]$$

$$\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}-$$

$$4\,i\,A\,b\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\tan\left[\frac{1}{2}(c+dx)\right]\right],-\frac{a+b}{a-b}\right]\tan\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}$$

$$\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+2\,i\,a\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\tan\left[\frac{1}{2}(c+dx)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\tan\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$i\,(a-b)\,B\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\tan\left[\frac{1}{2}(c+dx)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\left(1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+2\,i\,(A\,b-a\,B)\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\tan\left[\frac{1}{2}(c+dx)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\left.\left.\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\left(1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(b\sqrt{\frac{a-b}{a+b}}\,d\left(-1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{1+\tan\left[\frac{1}{2}(c+dx)\right]^2}{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}}\left(b\left(-1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)-a\left(1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)\right)\right)$$

- **Problem 619: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\cos[c+dx]}{\sqrt{a+b\cos[c+dx]}\,\sec[c+dx]^{3/2}}\,dx$$

Optimal (type 4, 539 leaves, 8 steps) :

$$-\frac{1}{4\,a\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,(4\,A\,b-3\,a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,(4\,A\,b-3\,a\,B+2\,b\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(4\,a\,A\,b-3\,a^2\,B-4\,b^2\,B\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{(4\,A\,b-3\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^2\,d}$$

Result (type 4, 1169 leaves) :

$$\frac{B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{4\,b\,d}+\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right.$$

$$\left(-4\,a\,A\,b\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-4\,A\,b^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+3\,a^2\,B\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+3\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+8\,A\,b^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^3-\right.$$

$$6\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^3+4\,a\,A\,b\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^5-4\,A\,b^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^5-3\,a^2\,B\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^5+3\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^5-$$

$$8\,a\,A\,b\,\text{EllipticPi}\Big[-1,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\frac{-a+b}{a+b}\Big]\sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$6\,a^2\,B\,\text{EllipticPi}\Big[-1,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\frac{-a+b}{a+b}\Big]\sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$8\,b^2\,B\,\text{EllipticPi}\Big[-1,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],\frac{-a+b}{a+b}\Big]\sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$8\,a\,A\,b\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$
$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+6\,a^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$
$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+8\,b^2\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$
$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+$$
$$(a+b)\,(-4\,A\,b+3\,a\,B)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$
$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-2\,(a-2\,b)\,b\,B\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$
$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\Big/$$
$$\left(4\,b^2\,d\,\sqrt{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(b\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)-a\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 620: Attempted integration timed out after 120 seconds.**

$$\int\frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 433 leaves, 6 steps):

$$-\left(2\left(5a^2 A b-8 A b^3-3a^3 B+6 a b^2 B\right)\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\ \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(3a^4\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)+$$

$$\left(2\,(a+2b)\,(4 A b+a\,(A-3B))\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\ \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(3a^3\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)+$$

$$\frac{2b\,(A b-a B)\,\mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{a\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}+\frac{2\left(a^2 A-4 A b^2+3 a b B\right)\sqrt{a+b\,\mathrm{Cos}[c+d x]}\ \mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{3a^2\left(a^2-b^2\right)d}$$

Result (type 1, 1 leaves):

???

## Problem 621: Unable to integrate problem.

$$\int\frac{(A+B\,\mathrm{Cos}[c+d x])\ \mathrm{Sec}[c+d x]^{3/2}}{(a+b\,\mathrm{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 345 leaves, 5 steps):

$$\left(2\left(a^2 A-2 A b^2+a b B\right)\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\ \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(a^3\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)-$$

$$\left(2\,(2 A b+a\,(A-B))\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\ \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(a^2\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)+\frac{2b\,(A b-a B)\sqrt{\mathrm{Sec}[c+d x]}\ \mathrm{Sin}[c+d x]}{a\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}$$

Result (type 8, 37 leaves) :

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \operatorname{Sec}[c + d x]^{3/2}}{(a + b \operatorname{Cos}[c + d x])^{3/2}} \, dx$$

- **Problem 622: Unable to integrate problem.**

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \sqrt{\operatorname{Sec}[c + d x]}}{(a + b \operatorname{Cos}[c + d x])^{3/2}} \, dx$$

Optimal (type 4, 324 leaves, 5 steps) :

$$\left(2 (A b - a B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right] \sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}}\right) \Big/ \left(a^2 \sqrt{a + b} \, d \sqrt{\operatorname{Sec}[c + d x]}\right) + \frac{1}{a \sqrt{a + b} \, d \sqrt{\operatorname{Sec}[c + d x]}} 2 (A + B) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right] \sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}} - \frac{2 (A b - a B) \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c + d x]}{\left(a^2 - b^2\right) d \sqrt{a + b \operatorname{Cos}[c + d x]}}$$

Result (type 8, 37 leaves) :

$$\int \frac{(A + B \operatorname{Cos}[c + d x]) \sqrt{\operatorname{Sec}[c + d x]}}{(a + b \operatorname{Cos}[c + d x])^{3/2}} \, dx$$

- **Problem 623: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A + B \operatorname{Cos}[c + d x]}{(a + b \operatorname{Cos}[c + d x])^{3/2} \sqrt{\operatorname{Sec}[c + d x]}} \, dx$$

Optimal (type 4, 476 leaves, 7 steps) :

$$-\left(2\,(A\,b-a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(a\,b\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\left(2\,(A\,b-a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/$$
$$\left(a\,b\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-\frac{1}{b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$2\,\sqrt{a+b}\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,(A\,b-a\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1403 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{2\,(A\,b-a\,B)\,\text{Sin}[c+d\,x]}{b\,\left(-a^2+b^2\right)}-\frac{2\,\left(a\,A\,b\,\text{Sin}[c+d\,x]-a^2\,B\,\text{Sin}[c+d\,x]\right)}{b\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+$$
$$\left(2\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(a\,A\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+A\,b^2\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-\right.\right.$$
$$a^2\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-a\,b\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-2\,A\,b^2\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+2\,a\,b\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-$$
$$a\,A\,b\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+A\,b^2\,\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+a^2\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-a\,b\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$
$$2\,i\,a^2\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$
$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+2\,i\,b^2\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$2\,\mathrm{i}\,a^2\,B\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+2\,\mathrm{i}\,b^2\,B\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$\mathrm{i}\,(a-b)\,(-A\,b+a\,B)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+\mathrm{i}\,(a-b)\,(-A\,b+(2\,a+b)\,B)\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\left.\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(b\sqrt{\frac{a-b}{a+b}}\,\left(a^2-b^2\right)d\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(b\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-a\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 624: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 560 leaves, 8 steps) :

$$\left((2aAb-3a^2B+b^2B)\sqrt{\text{Cos}[c+dx]}\,\text{Csc}[c+dx]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a(1-\text{Sec}[c+dx])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+dx])}{a-b}}\right)\Big/\left(ab^2\sqrt{a+b}\,d\sqrt{\text{Sec}[c+dx]}\right)-$$

$$\left((2Ab-(3a+b)B)\sqrt{\text{Cos}[c+dx]}\,\text{Csc}[c+dx]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a(1-\text{Sec}[c+dx])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+dx])}{a-b}}\right)\Big/\left(b^2\sqrt{a+b}\,d\sqrt{\text{Sec}[c+dx]}\right)-\frac{1}{b^3d\sqrt{\text{Sec}[c+dx]}}$$

$$\sqrt{a+b}\,(2Ab-3aB)\sqrt{\text{Cos}[c+dx]}\,\text{Csc}[c+dx]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+dx]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a(1-\text{Sec}[c+dx])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+dx])}{a-b}}+\frac{2a(Ab-aB)\,\text{Sin}[c+dx]}{b\,(a^2-b^2)\,d\sqrt{a+b\,\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}-$$

$$\frac{(2aAb-3a^2B+b^2B)\sqrt{a+b\,\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{b^2\,(a^2-b^2)\,d}$$

Result (type 4, 1567 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}\left(-\frac{2a(-Ab+aB)\,\text{Sin}[c+dx]}{b^2(a^2-b^2)}+\frac{2(a^2Ab\,\text{Sin}[c+dx]-a^3B\,\text{Sin}[c+dx])}{b^2(-a^2+b^2)(a+b\,\text{Cos}[c+dx])}\right)}{d}-$$

$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\right.$$

$$\left(2a^2Ab\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]+2aAb^2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-3a^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-3a^2bB\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]+ab^2B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$b^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]-4aAb^2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3+6a^2bB\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3-2b^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3-2a^2Ab\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+$$

$$2aAb^2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+3a^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-3a^2bB\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5-ab^2B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+b^3B\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^5+$$

$$4 a^2 A b \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} -$$

$$4 A b^3 \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} -$$

$$6 a^3 B \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$6 a b^2 B \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$4 a^2 A b \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} - 4 A b^3 \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} -$$

$$6 a^3 B \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} + 6 a b^2 B \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} -$$

$$(a+b)\left(-2 a A b+3 a^2 B-b^2 B\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} + 2 b (a+b)(-A b+a B) \,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\Bigg)\Bigg)\Bigg/$$

$$\left(b^2\left(-a^2+b^2\right) d\sqrt{1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(b\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-a\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\right)$$

- **Problem 625: Attempted integration timed out after 120 seconds.**

$$\int\frac{(A+B\,\mathrm{Cos}[c+d x])\,\mathrm{Sec}[c+d x]^{5/2}}{(a+b\,\mathrm{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 4, 607 leaves, 7 steps):

$$-\left(2\left(8 a^4 A b-28 a^2 A b^3+16 A b^5-3 a^5 B+15 a^3 b^2 B-8 a b^4 B\right)\sqrt{\mathrm{Cos}[c+d x]}\,\mathrm{Csc}[c+d x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a(1-\mathrm{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Bigg/\left(3 a^5 (a-b)(a+b)^{3/2} d\sqrt{\mathrm{Sec}[c+d x]}\right)-$$

$$\left(2\left(16 A b^4-a^4(A-3 B)+4 a b^3(3 A-2 B)-9 a^3 b(A-B)-2 a^2 b^2(8 A+3 B)\right)\sqrt{\mathrm{Cos}[c+d x]}\,\mathrm{Csc}[c+d x]\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Bigg/$$

$$\left(3 a^4\sqrt{a+b}\left(a^2-b^2\right) d\sqrt{\mathrm{Sec}[c+d x]}\right)+\frac{2 b(A b-a B)\,\mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{3 a\left(a^2-b^2\right) d\,(a+b\,\mathrm{Cos}[c+d x])^{3/2}}+$$

$$\frac{2 b\left(10 a^2 A b-6 A b^3-7 a^3 B+3 a b^2 B\right)\mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{3 a^2\left(a^2-b^2\right)^2 d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}+$$

$$\frac{2\left(a^4 A-13 a^2 A b^2+8 A b^4+8 a^3 b B-4 a b^3 B\right)\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{3 a^3\left(a^2-b^2\right)^2 d}$$

Result (type 1, 1 leaves):

???

- **Problem 626: Attempted integration timed out after 120 seconds.**

$$\int \frac{(A+B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 496 leaves, 6 steps):

$$\left(2\left(3\,a^4\,A-15\,a^2\,A\,b^2+8\,A\,b^4+6\,a^3\,b\,B-2\,a\,b^3\,B\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^4\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\left(2\left(8\,A\,b^3-3\,a^3\,(A-B)+2\,a\,b^2\,(3\,A-B)-3\,a^2\,b\,(3\,A+B)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^3\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\frac{2\,b\,(A\,b-a\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\,b\,\left(8\,a^2\,A\,b-4\,A\,b^3-5\,a^3\,B+a\,b^2\,B\right)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 1, 1 leaves):

???

- **Problem 627: Unable to integrate problem.**

$$\int \frac{(A+B\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 469 leaves, 6 steps):

$$\left(2\left(6 a^2 A b-2 A b^3-3 a^3 B-a b^2 B\right)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/\left(3 a^3\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d x]}\right)-$$

$$\left(2\left(2 A b^2-3 a^2\,(A+B)+a b\,(3 A+B)\right)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/\left(3 a^2\sqrt{a+b}\,\left(a^2-b^2\right)d\,\sqrt{\text{Sec}[c+d x]}\right)+$$

$$\frac{2 b\,(A b-a B)\,\text{Sin}[c+d x]}{3 a\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d x])^{3/2}\sqrt{\text{Sec}[c+d x]}}-\frac{2\left(6 a^2 A b-2 A b^3-3 a^3 B-a b^2 B\right)\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{3 a\left(a^2-b^2\right)^2 d\,\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 8, 37 leaves):

$$\int \frac{(A+B\,\text{Cos}[c+d x])\,\sqrt{\text{Sec}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^{5/2}}\,dx$$

- **Problem 628: Unable to integrate problem.**

$$\int \frac{A+B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^{5/2}\sqrt{\text{Sec}[c+d x]}}\,dx$$

Optimal (type 4, 431 leaves, 6 steps):

$$-\left(2\left(3a^2 A+A b^2-4 a b B\right)\sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/\left(3a^2\,(a-b)\,(a+b)^{3/2}\,d\sqrt{\text{Sec}[c+d x]}\right)+$$
$$\left(2\,(a\,(3A+B)-b\,(A+3B))\sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/\left(3a\,(a-b)\,(a+b)^{3/2}\,d\sqrt{\text{Sec}[c+d x]}\right)-$$
$$\frac{2\,(A b-a B)\,\text{Sin}[c+d x]}{3\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d x])^{3/2}\sqrt{\text{Sec}[c+d x]}}+\frac{2\left(3a^2 A+A b^2-4 a b B\right)\sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{3\left(a^2-b^2\right)^2 d\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 8, 37 leaves):

$$\int\frac{A+B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^{5/2}\sqrt{\text{Sec}[c+d x]}}\,dx$$

- **Problem 629: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^{5/2}\,\text{Sec}[c+d x]^{3/2}}\,dx$$

Optimal (type 4, 602 leaves, 8 steps):

$$\Big(2\left(4Ab^3+3a^3B-7ab^2B\right)\sqrt{\text{Cos}[c+dx]}\ \text{Csc}[c+dx]\ \text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+dx]}}\Big],-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+dx])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+dx])}{a-b}}\Big)\Big/\left(3a\,(a-b)\,b^2\,(a+b)^{3/2}\,d\sqrt{\text{Sec}[c+dx]}\right)-$$

$$\Big(2\left(3Ab^3+3a^3B+a^2bB-ab^2\,(A+6B)\right)\sqrt{\text{Cos}[c+dx]}\ \text{Csc}[c+dx]\ \text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+dx]}}\Big],-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+dx])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+dx])}{a-b}}\Big)\Big/\left(3a\,(a-b)\,b^2\,(a+b)^{3/2}\,d\sqrt{\text{Sec}[c+dx]}\right)-$$

$$\frac{1}{b^3\,d\sqrt{\text{Sec}[c+dx]}}2\sqrt{a+b}\ B\sqrt{\text{Cos}[c+dx]}\ \text{Csc}[c+dx]\ \text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+dx]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+dx]}}\Big],-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+dx])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+dx])}{a-b}}+$$

$$\frac{2a\,(Ab-aB)\,\text{Sin}[c+dx]}{3b\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+dx])^{3/2}\sqrt{\text{Sec}[c+dx]}}-\frac{2a\left(4Ab^3+3a^3B-7ab^2B\right)\sqrt{\text{Sec}[c+dx]}\ \text{Sin}[c+dx]}{3b^2\left(a^2-b^2\right)^2d\sqrt{a+b\,\text{Cos}[c+dx]}}$$

Result (type 4, 1994 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+dx]}\ \sqrt{\text{Sec}[c+dx]}\ \left(\frac{2\left(4Ab^3+3a^3B-7ab^2B\right)\text{Sin}[c+dx]}{3b^2\left(-a^2+b^2\right)^2}-\right.$$

$$\left.\frac{2\left(-a^2Ab\,\text{Sin}[c+dx]+a^3B\,\text{Sin}[c+dx]\right)}{3b^2\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+dx])^2}-\frac{2\left(-a^3Ab\,\text{Sin}[c+dx]+5aAb^3\,\text{Sin}[c+dx]+4a^4B\,\text{Sin}[c+dx]-8a^2b^2B\,\text{Sin}[c+dx]\right)}{3b^2\left(-a^2+b^2\right)^2(a+b\,\text{Cos}[c+dx])}\right)-$$

$$\Bigg(2\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\ \Bigg(4aAb^3\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\Big[\frac{1}{2}(c+dx)\Big]+4Ab^4\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\Big[\frac{1}{2}(c+dx)\Big]+$$

$$3a^4\sqrt{\frac{a-b}{a+b}}\ B\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]+3a^3b\sqrt{\frac{a-b}{a+b}}\ B\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]-7a^2b^2\sqrt{\frac{a-b}{a+b}}\ B\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]-$$

$$7\,a\,b^3\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-8\,A\,b^4\,\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-6\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+$$

$$14\,a\,b^3\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-4\,a\,A\,b^3\,\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+4\,A\,b^4\,\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$3\,a^4\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a^3\,b\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+7\,a^2\,b^2\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$7\,a\,b^3\,\sqrt{\frac{a-b}{a+b}}\;B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+6\,i\,a^4\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-12\,i\,a^2\,b^2\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\;\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$6\,i\,b^4\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,i\,a^4\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\;\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$12\,i\,a^2\,b^2\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,i\,b^4\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\;\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$\text{i} (a-b) \left(4 A b^3+3 a^3 B-7 a b^2 B\right) \text{EllipticE}\left[\text{i} \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}} \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}} -$$

$$\text{i} (a-b) \left(3 b^3 (A-B)+6 a^3 B+4 a^2 b B-a b^2 (A+9 B)\right) \text{EllipticF}\left[\text{i} \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}} \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}}\right)\right) \Big/$$

$$\left(3 b^2 \sqrt{\frac{a-b}{a+b}} \left(a^2-b^2\right)^2 d \left(-1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) \sqrt{\frac{1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}} \left(b \left(-1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)-a \left(1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)\right)\right)$$

- **Problem 630: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+B \text{Cos}[c+d x]}{(a+b \text{Cos}[c+d x])^{5/2} \text{Sec}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 733 leaves, 9 steps) :

$$\left(\left(6 a^3 A b - 14 a A b^3 - 15 a^4 B + 26 a^2 b^2 B - 3 b^4 B\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3 a\,(a-b)\,b^3\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d x]}\right) +$$

$$\left(\left(3 b^3\,(4 A - B) + 15 a^3 B - a b^2\,(2 A + 21 B) - a^2\,(6 A b - 5 b B)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3\,(a-b)\,b^3\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d x]}\right) - \frac{1}{b^4\,d\,\sqrt{\text{Sec}[c+d x]}}$$

$$\sqrt{a+b}\ (2 A b - 5 a B)\ \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 a\,(A b - a B)\,\text{Sin}[c+d x]}{3 b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{3/2}} + \frac{2 a\,\left(2 a^2 A b - 6 A b^3 - 5 a^3 B + 9 a b^2 B\right)\,\text{Sin}[c+d x]}{3 b^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d x]}\ \sqrt{\text{Sec}[c+d x]}} -$$

$$\frac{\left(6 a^3 A b - 14 a A b^3 - 15 a^4 B + 26 a^2 b^2 B - 3 b^4 B\right) \sqrt{a+b\,\text{Cos}[c+d x]}\ \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{3 b^3\,\left(a^2-b^2\right)^2\,d}$$

Result (type 4, 2342 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d x]}\ \sqrt{\text{Sec}[c+d x]}\ \left(-\frac{2 a\,\left(-3 a^2 A b + 7 A b^3 + 6 a^3 B - 10 a b^2 B\right)\,\text{Sin}[c+d x]}{3 b^3\,\left(a^2-b^2\right)^2} +\right.$$

$$\left.\frac{2\,\left(-a^3 A b\,\text{Sin}[c+d x] + a^4 B\,\text{Sin}[c+d x]\right)}{3 b^3\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d x])^2} + \frac{2\,\left(-4 a^4 A b\,\text{Sin}[c+d x] + 8 a^2 A b^3\,\text{Sin}[c+d x] + 7 a^5 B\,\text{Sin}[c+d x] - 11 a^3 b^2 B\,\text{Sin}[c+d x]\right)}{3 b^3\,\left(-a^2+b^2\right)^2\,(a+b\,\text{Cos}[c+d x])}\right) +$$

$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d x)\right]^2}}\ \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d x)\right]^2 - b\,\text{Tan}\left[\frac{1}{2}\,(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d x)\right]^2}}\right.$$

$$\Big(6 a^4 A b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+6 a^3 A b^2 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-14 a^2 A b^3 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-14 a A b^4 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-15 a^5 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-$$

$$15 a^4 b B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+26 a^3 b^2 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+26 a^2 b^3 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-3 a b^4 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-3 b^5 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]-$$

$$12 a^3 A b^2 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3+28 a A b^4 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3+30 a^4 b B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3-52 a^2 b^3 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3+6 b^5 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3-$$

$$6 a^4 A b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5+6 a^3 A b^2 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5+14 a^2 A b^3 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5-14 a A b^4 \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5+15 a^5 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5-$$

$$15 a^4 b B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5-26 a^3 b^2 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5+26 a^2 b^3 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5+3 a b^4 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5-3 b^5 B \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5+$$

$$12 a^4 A b \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$24 a^2 A b^3 \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$12 A b^5 \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$30 a^5 B \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$60 a^3 b^2 B \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$30 a b^4 B \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$12 a^4 A b \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-24 a^2 A b^3 \,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+12\,A\,b^5\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$30\,a^5\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+60\,a^3\,b^2\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-30\,a\,b^4\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$(a+b)\left(-6\,a^3\,A\,b+14\,a\,A\,b^3+15\,a^4\,B-26\,a^2\,b^2\,B+3\,b^4\,B\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$2\,b\,(a+b)\left(3\,A\,b^3+3\,a\,b^2\,(A-2\,B)+5\,a^3\,B-a^2\,b\,(2\,A+3\,B)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(3\,b^3\left(a^2-b^2\right)^2 d\sqrt{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(b\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-a\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\right)$$

## Problem 631: Unable to integrate problem.

$$\int\frac{(a\,B+b\,B\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 266 leaves, 5 steps):

$$\frac{1}{a^2 d \sqrt{\text{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b}\, B \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{a d \sqrt{\text{Sec}[c+d x]}}$$

$$2 \sqrt{a+b}\, B \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}$$

Result (type 8, 40 leaves):

$$\int \frac{(a B+b B\,\text{Cos}[c+d x])\, \text{Sec}[c+d x]^{3/2}}{(a+b\,\text{Cos}[c+d x])^{3/2}} \, dx$$

## Problem 633: Unable to integrate problem.

$$\int \frac{a B+b B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^{3/2} \sqrt{\text{Sec}[c+d x]}} \, dx$$

Optimal (type 4, 137 leaves, 3 steps):

$$-\frac{1}{b d \sqrt{\text{Sec}[c+d x]}}$$

$$2 \sqrt{a+b}\, B \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]\, \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}$$

Result (type 8, 40 leaves):

$$\int \frac{a B+b B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^{3/2} \sqrt{\text{Sec}[c+d x]}} \, dx$$

## Problem 634: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{a B+b B\,\text{Cos}[c+d x]}{(a+b\,\text{Cos}[c+d x])^{3/2}\, \text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 479 leaves, 10 steps):

$$-\frac{1}{a\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{1}{b\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}a\,\sqrt{a+b}\,\,B\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{B\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,B\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 760 leaves) :

$$\frac{1}{b\sqrt{\frac{a-b}{a+b}}\ d\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}}\ B\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\ \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\left(a\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}+b\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}+\right.$$

$$a\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}-b\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}+$$

$$2\,i\,a\,\text{EllipticPi}\left[\frac{a+b}{a-b},\ i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$2\,i\,a\,\text{EllipticPi}\left[\frac{a+b}{a-b},\ i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\ -\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$i\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\ -\frac{a+b}{a-b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$\left.2\,i\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\ \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\ -\frac{a+b}{a-b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 637: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[e+f\,x])^3\,(A+B\,\text{Cos}[e+f\,x])\,(c\,\text{Sec}[e+f\,x])^m\,dx$$

Optimal (type 5, 455 leaves, 9 steps):

$$-\Big(c^5\left(a^3 A\left(8-6m+m^2\right)+3aAb^2\left(4-5m+m^2\right)+3a^2bB\left(4-5m+m^2\right)+b^3B\left(3-4m+m^2\right)\right)$$

$$\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{5-m}{2},\frac{7-m}{2},\text{Cos}[e+fx]^2\right](c\,\text{Sec}[e+fx])^{-5+m}\,\text{Sin}[e+fx]\Big)\Big/\left(f(1-m)(3-m)(5-m)\sqrt{\text{Sin}[e+fx]^2}\right)-$$

$$\Big(c^4\left(Ab^3(2-m)+3ab^2B(2-m)+3a^2Ab(3-m)+a^3B(3-m)\right)\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{4-m}{2},\frac{6-m}{2},\text{Cos}[e+fx]^2\right]$$

$$(c\,\text{Sec}[e+fx])^{-4+m}\,\text{Sin}[e+fx]\Big)\Big/\left(f(2-m)(4-m)\sqrt{\text{Sin}[e+fx]^2}\right)-$$

$$\frac{a c^4\left(3abB(1-m)+a^2A(2-m)-2Ab^2m\right)(c\,\text{Sec}[e+fx])^{-4+m}\,\text{Tan}[e+fx]}{f(1-m)(3-m)}-$$

$$\frac{a^2c^4\left(aB(1-m)-Ab(1+m)\right)\text{Sec}[e+fx](c\,\text{Sec}[e+fx])^{-4+m}\,\text{Tan}[e+fx]}{f(1-m)(2-m)}-$$

$$\frac{aAc^4(c\,\text{Sec}[e+fx])^{-4+m}(b+a\,\text{Sec}[e+fx])^2\,\text{Tan}[e+fx]}{f(1-m)}$$

Result (type 5, 966 leaves) :

$$\left(8\,\text{Cos}[e+f x]^4\,(c\,\text{Sec}[e+f x])^m\,\left(\text{Sec}[e+f x]^2\right)^{\frac{1-m}{2}}\,(b+a\,\text{Sec}[e+f x])^3\,(B+A\,\text{Sec}[e+f x])\right.$$
$$\left(a^3\,A\,\text{Hypergeometric2F1}\left[\frac{1}{2},3-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+3\,a\,A\,b^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},3-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+\right.$$
$$3\,a^2\,b\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},3-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+b^3\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},3-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+$$
$$3\,a^2\,A\,b\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+$$
$$A\,b^3\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+a^3\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+$$
$$3\,a\,b^2\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{7}{2}-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]+\frac{2}{3}\,a^3\,A\,\text{Hypergeometric2F1}\left[\frac{3}{2},3-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]$$
$$\text{Tan}[e+f x]^3+a\,A\,b^2\,\text{Hypergeometric2F1}\left[\frac{3}{2},3-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^3+$$
$$a^2\,b\,B\,\text{Hypergeometric2F1}\left[\frac{3}{2},3-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^3+2\,a^2\,A\,b\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]$$
$$\text{Tan}[e+f x]^3+\frac{1}{3}\,A\,b^3\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^3+\frac{2}{3}\,a^3\,B$$
$$\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^3+a\,b^2\,B\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{7}{2}-\frac{m}{2},\frac{5}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^3+$$
$$\frac{1}{5}\,a^3\,A\,\text{Hypergeometric2F1}\left[\frac{5}{2},3-\frac{m}{2},\frac{7}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^5+\frac{3}{5}\,a^2\,A\,b\,\text{Hypergeometric2F1}\left[\frac{5}{2},\frac{7}{2}-\frac{m}{2},\frac{7}{2},-\text{Tan}[e+f x]^2\right]$$
$$\left.\left.\text{Tan}[e+f x]^5+\frac{1}{5}\,a^3\,B\,\text{Hypergeometric2F1}\left[\frac{5}{2},\frac{7}{2}-\frac{m}{2},\frac{7}{2},-\text{Tan}[e+f x]^2\right]\,\text{Tan}[e+f x]^5\right)\right)\Big/$$
$$\left(f\,\left(24\,a^2\,A\,b+4\,A\,b^3+8\,a^3\,B+12\,a\,b^2\,B+8\,a^3\,A\,\sqrt{\text{Sec}[e+f x]^2}+12\,a\,A\,b^2\,\sqrt{\text{Sec}[e+f x]^2}+12\,a^2\,b\,B\,\sqrt{\text{Sec}[e+f x]^2}+\right.\right.$$
$$3\,b^3\,B\,\sqrt{\text{Sec}[e+f x]^2}+b^3\,B\,\text{Cos}[4\,(e+f x)]\,\sqrt{\text{Sec}[e+f x]^2}+$$
$$\left.\left.4\,b\,\text{Cos}[2\,(e+f x)]\,\left(A\,b\,\left(b+3\,a\,\sqrt{\text{Sec}[e+f x]^2}\right)+B\,\left(3\,a\,b+3\,a^2\,\sqrt{\text{Sec}[e+f x]^2}+b^2\,\sqrt{\text{Sec}[e+f x]^2}\right)\right)\right)\right)$$

- **Problem 639: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[e+f x])\,(A+B\,\text{Cos}[e+f x])\,(c\,\text{Sec}[e+f x])^m\,dx$$

Optimal (type 5, 217 leaves, 7 steps) :

$$-\left(c^3\,(b\,B\,(1-m)+a\,A\,(2-m))\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3-m}{2},\frac{5-m}{2},\text{Cos}[e+f\,x]^2\right]\,(c\,\text{Sec}[e+f\,x])^{-3+m}\,\text{Sin}[e+f\,x]\right)\Big/$$
$$\left(f\,(1-m)\,(3-m)\,\sqrt{\text{Sin}[e+f\,x]^2}\right)-$$
$$\frac{(A\,b+a\,B)\,c^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2-m}{2},\frac{4-m}{2},\text{Cos}[e+f\,x]^2\right]\,(c\,\text{Sec}[e+f\,x])^{-2+m}\,\text{Sin}[e+f\,x]}{f\,(2-m)\,\sqrt{\text{Sin}[e+f\,x]^2}}-\frac{a\,A\,c^2\,(c\,\text{Sec}[e+f\,x])^{-2+m}\,\text{Tan}[e+f\,x]}{f\,(1-m)}$$

Result (type 6, 16 794 leaves) :

$$\Bigg(6\,\text{Sec}[e+f\,x]^{-m}\,(c\,\text{Sec}[e+f\,x])^m$$
$$\left(b\,B\,\text{Sec}[e+f\,x]^{-2+m}+a\,A\,\text{Sec}[e+f\,x]^m+\text{Cos}[e+f\,x]\,(A\,b\,\text{Sec}[e+f\,x]^m+a\,B\,\text{Sec}[e+f\,x]^m)\right)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\,\left(\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}\right)^m$$
$$\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^{-3+m}\,\Bigg(\Bigg(a\,A\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\Bigg)\Big/$$
$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+2\,\Bigg((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$
$$\left.-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\Bigg)-$$
$$\Bigg(A\,b\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\Bigg)\Big/$$
$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+2\,\Bigg((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$
$$\left.-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\Bigg)-$$
$$\Bigg(a\,B\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\Bigg)\Big/$$
$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+2\,\Bigg((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$
$$\left.-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\Bigg)+$$
$$\Bigg(b\,B\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\Bigg)\Big/$$
$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right]+2\,\Bigg((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(2\,A\,b\,\mathrm{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-2+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(2\,a\,B\,\mathrm{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-2+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(4\,b\,B\,\mathrm{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-2+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(4\,b\,B\,\mathrm{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\Big/\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.$$

$$-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-3+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,4-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.$$

$$\left.\left.\left.m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,3-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\right)\Big/$$

$$\left(f\left(6\,(-3+m)\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\left(\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^{-4+m}\right.\right.$$

$$\left(\left(\left(a\,A\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/\right.\right.$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(A\,b\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$
$$\left(a\,B\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$
$$\left(b\,B\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$
$$\left(2\,A\,b\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$
$$\left(2\,a\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$
$$\left(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.$$

$$-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-3+m)\,\text{AppellF1}\left[\frac{3}{2},m,4-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,\right.\right.$$

$$\left.\left.\left.3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)+3\,\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\left(\frac{1}{1-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}\right)^m$$

$$\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^{-3+m}\left(\left(a\,A\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$

$$\left(A\,b\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$

$$\left(a\,B\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(b\,B\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(2\,A\,b\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)+$$

$$\Big(2\,a\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\,\Big((-2+m)\,\text{AppellF1}\Big[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)-$$

$$\Big(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\,\Big((-2+m)\,\text{AppellF1}\Big[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)+$$

$$\Big(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+2\,\Big((-3+m)\,\text{AppellF1}\left[\frac{3}{2},m,4-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+$$

$$m\,\text{AppellF1}\left[\frac{3}{2},1+m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)\Big)+$$

$$6\,m\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\left(\frac{1}{1-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^{1+m}\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^{-3+m}$$

$$\Bigg(\Big(\Big(a\,A\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\,\Big((-1+m)\,\text{AppellF1}\Big[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)-$$

$$\Big(A\,b\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\,\Big((-1+m)\,\text{AppellF1}\Big[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)-$$

$$\Big(a\,B\,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^2\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2\Big((-1+m)\,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m\,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big) +$$

$$\Big(b\,B\,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^2\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2\Big((-1+m)\,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m\,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big) +$$

$$\Big(2\,A\,b\,\text{AppellF1}\Big[\frac{1}{2}, m, 2-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, m, 2-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2\Big((-2+m)\,\text{AppellF1}\Big[\frac{3}{2}, m, 3-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m\,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big) +$$

$$\Big(2\,a\,B\,\text{AppellF1}\Big[\frac{1}{2}, m, 2-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, m, 2-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2\Big((-2+m)\,\text{AppellF1}\Big[\frac{3}{2}, m, 3-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m\,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big) -$$

$$\Big(4\,b\,B\,\text{AppellF1}\Big[\frac{1}{2}, m, 2-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, m, 2-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2\Big((-2+m)\,\text{AppellF1}\Big[\frac{3}{2}, m, 3-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m\,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big) +$$

$$\Big(4\,b\,B\,\text{AppellF1}\Big[\frac{1}{2}, m, 3-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, m, 3-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2\Big((-3+m)\,\text{AppellF1}\Big[\frac{3}{2}, m, 4-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] +$$

$$m\,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 3-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big)\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)\Big) +$$

$$6\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\left(\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^{-3+m}$$

$$\left(\left(2\,a\,A\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/\right.$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(2\,A\,b\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(2\,a\,B\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(2\,b\,B\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(a\,A\left(-\frac{1}{3}(1-m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{3}m\,\mathrm{AppellF1}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(A\,b\left(-\frac{1}{3}(1-m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$

$$\left(a\,B\left(-\frac{1}{3}(1-m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(b\,B\left(-\frac{1}{3}(1-m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(2\,A\,b\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(2\,a\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$

$$\left(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(2\,A\,b\left(-\frac{1}{3}(2-m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(2\,a\,B\left(-\frac{1}{3}(2-m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)-$$

$$\left(4\,b\,B\left(-\frac{1}{3}(2-m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\left.\left.\left.\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(4\,b\,B\left(-\frac{1}{3}(3-m)\,\text{AppellF1}\left[\frac{3}{2},m,4-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]+\right.\right.$$

$$\left.\left.\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right]+2\left((-3+m)\,\text{AppellF1}\left[\frac{3}{2},m,4-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.\right.$$

$$-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)-$$

$$\Bigg(a\,A\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2$$

$$\Bigg(2\Bigg((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+$$

$$m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$3\Bigg(-\frac{1}{3}(1-m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\frac{1}{3}m\,\text{AppellF1}\Big[$$

$$\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)+2\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\Bigg((-1+m)\Bigg(-\frac{3}{5}(2-m)\,\text{AppellF1}\left[\frac{5}{2},m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)+$$

$$m\Bigg(-\frac{3}{5}(1-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+2\Bigg((-1+m)\,\text{AppellF1}\Big[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)^2+$$

$$\Bigg(A\,b\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2$$

$$\Bigg(2\Bigg((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+$$

$$m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$3\Bigg(-\frac{1}{3}(1-m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\frac{1}{3}m\,\text{AppellF1}\Big[$$

$$\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)+2\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\Bigg((-1+m)\Bigg(-\frac{3}{5}(2-m)\,\text{AppellF1}\left[\frac{5}{2},m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$\frac{3}{5} m \,\text{AppellF1}\Big[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big) +$$

$$m \Big(-\frac{3}{5}(1-m) \,\text{AppellF1}\Big[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big] +$$

$$\frac{3}{5}(1+m) \,\text{AppellF1}\Big[\frac{5}{2}, 2+m, 1-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big)\Big)\Big)\Big)\Big) \Big/$$

$$\Big(3 \,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2 \Big((-1+m) \,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m \,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big) \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^2 +$$

$$\Big(a B \,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^2$$

$$\Big(2 \Big((-1+m) \,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] +$$

$$m \,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big) \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big] +$$

$$3 \Big(-\frac{1}{3}(1-m) \,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big] + \frac{1}{3} m \,\text{AppellF1}\Big[$$

$$\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big) + 2 \,\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2$$

$$\Big((-1+m) \Big(-\frac{3}{5}(2-m) \,\text{AppellF1}\Big[\frac{5}{2}, m, 3-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big] +$$

$$\frac{3}{5} m \,\text{AppellF1}\Big[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big) +$$

$$m \Big(-\frac{3}{5}(1-m) \,\text{AppellF1}\Big[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big] +$$

$$\frac{3}{5}(1+m) \,\text{AppellF1}\Big[\frac{5}{2}, 2+m, 1-m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \text{Sec}\Big[\frac{1}{2}(e+f x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]\Big)\Big)\Big)\Big)\Big) \Big/$$

$$\Big(3 \,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + 2 \Big((-1+m) \,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] + m \,\text{AppellF1}\Big[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big]\Big) \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^2 -$$

$$\Big(b B \,\text{AppellF1}\Big[\frac{1}{2}, m, 1-m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] \Big(1+\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big)^2$$

$$\Big(2 \Big((-1+m) \,\text{AppellF1}\Big[\frac{3}{2}, m, 2-m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2, -\text{Tan}\Big[\frac{1}{2}(e+f x)\Big]^2\Big] +$$

$$m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$3\left(-\frac{1}{3}(1-m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.$$

$$\left.\left.\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\Bigg((-1+m)\left(-\frac{3}{5}(2-m)\,\text{AppellF1}\left[\frac{5}{2},m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\right.$$

$$\left.\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)+$$

$$m\left(-\frac{3}{5}(1-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\right.$$

$$\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},m,1-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+2\left((-1+m)\,\text{AppellF1}\left[\frac{3}{2},m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\right.\right.$$

$$\left.\left.-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)^2-$$

$$\Bigg(2\,A\,b\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)$$

$$\Bigg(2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]+\right.$$

$$\left.m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+$$

$$3\left(-\frac{1}{3}(2-m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.$$

$$\left.\left.\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\Bigg((-2+m)\left(-\frac{3}{5}(3-m)\,\text{AppellF1}\left[\frac{5}{2},m,4-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\right.$$

$$\left.\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)+$$

$$m\left(-\frac{3}{5}(2-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]+\right.$$

$$\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2-$$

$$\left(2\,a\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right.$$

$$\left(2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.\right.$$

$$\left.m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3\left(-\frac{1}{3}(2-m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.$$

$$\left.\left.\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((-2+m)\left(-\frac{3}{5}(3-m)\,\text{AppellF1}\left[\frac{5}{2},m,4-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\right.\right.$$

$$\left.\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+$$

$$m\left(-\frac{3}{5}(2-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\right.$$

$$\left.\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2+$$

$$\left(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right.$$

$$\left(2\left((-2+m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+\right.\right.$$

$$\left.m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3\left(-\frac{1}{3}(2-m)\,\text{AppellF1}\left[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{3}m\,\text{AppellF1}\left[\right.\right.$$

$$\left.\left.\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((-2+m)\left(-\frac{3}{5}(3-m)\,\text{AppellF1}\left[\frac{5}{2},m,4-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\right.\right.$$

$$\left.\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+$$

$$m\left(-\frac{3}{5}(2-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\right.$$

$$\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,2-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\Big)\Big)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},m,2-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\Big((-2+m)\,\text{AppellF1}\Big[\frac{3}{2},m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,2-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)^2-$$

$$\Big(4\,b\,B\,\text{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big(2\Big((-3+m)\,\text{AppellF1}\Big[\frac{3}{2},m,4-m,\frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+3\Big(-\frac{1}{3}(3-m)\,\text{AppellF1}\Big[\frac{3}{2},m,4-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\frac{1}{3}m\,\text{AppellF1}\Big[\frac{3}{2},1+m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Big)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\Big((-3+m)\left(-\frac{3}{5}(4-m)\,\text{AppellF1}\left[\frac{5}{2},m,5-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\right.$$

$$\left.\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+m,4-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+$$

$$m\left(-\frac{3}{5}(3-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,4-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+\right.$$

$$\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,3-m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\Big)\Big)\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},m,3-m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]+2\Big((-3+m)\,\text{AppellF1}\Big[\frac{3}{2},m,4-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big]+m\,\text{AppellF1}\left[\frac{3}{2},1+m,3-m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right]\Big)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Big)^2\Big)\Big)\Big)$$

- **Problem 640: Result more than twice size of optimal antiderivative.**

$$\int \frac{(A+B\,\mathrm{Cos}[e+f\,x])\,(c\,\mathrm{Sec}[e+f\,x])^m}{a+b\,\mathrm{Cos}[e+f\,x]}\,dx$$

Optimal (type 6, 299 leaves, 10 steps) :

$$-\frac{1}{\left(a^2-b^2\right)c\,f}(A\,b-a\,B)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},\mathrm{Sin}[e+f\,x]^2,-\frac{b^2\,\mathrm{Sin}[e+f\,x]^2}{a^2-b^2}\right]\mathrm{Cos}[e+f\,x]\left(\mathrm{Cos}[e+f\,x]^2\right)^{m/2}(c\,\mathrm{Sec}[e+f\,x])^{1+m}\,\mathrm{Sin}[e+f\,x]+\frac{1}{b\left(a^2-b^2\right)c\,f}a\,(A\,b-a\,B)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1+m}{2},1,\frac{3}{2},\mathrm{Sin}[e+f\,x]^2,-\frac{b^2\,\mathrm{Sin}[e+f\,x]^2}{a^2-b^2}\right]\left(\mathrm{Cos}[e+f\,x]^2\right)^{\frac{1+m}{2}}(c\,\mathrm{Sec}[e+f\,x])^{1+m}\,\mathrm{Sin}[e+f\,x]-\frac{B\,c\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1-m}{2},\frac{3-m}{2},\mathrm{Cos}[e+f\,x]^2\right](c\,\mathrm{Sec}[e+f\,x])^{-1+m}\,\mathrm{Sin}[e+f\,x]}{b\,f\,(1-m)\sqrt{\mathrm{Sin}[e+f\,x]^2}}$$

Result (type 6, 10 630 leaves) :

$$\Bigg(\mathrm{Sec}[e+f\,x]^{1-m}(c\,\mathrm{Sec}[e+f\,x])^m\left(\frac{B\,\mathrm{Sec}[e+f\,x]^{-1+m}}{a+b\,\mathrm{Cos}[e+f\,x]}+\frac{A\,\mathrm{Sec}[e+f\,x]^m}{a+b\,\mathrm{Cos}[e+f\,x]}\right)\mathrm{Sin}[e+f\,x]\Bigg(\frac{A\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}-\frac{m}{2},\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2\right]}{b}-\frac{a\,B\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}-\frac{m}{2},\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2\right]}{b^2}+\frac{B\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},1-\frac{m}{2},\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2\right]}{b}+\left(3\,a^2\,A\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2,\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\left(1+\mathrm{Tan}[e+f\,x]^2\right)^{\frac{1+m}{2}}\right)\Big/\left(b\left(-3\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\left(a^2-b^2\right)(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\mathrm{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\mathrm{Tan}[e+f\,x]^2\right)\right)\right)-\left(3\,a^3\left(a^2-b^2\right)B\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2,\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\left(1+\mathrm{Tan}[e+f\,x]^2\right)^{\frac{1+m}{2}}\right)\Big/\left(b^2\left(-3\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\left(a^2-b^2\right)(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\mathrm{Tan}[e+f\,x]^2\right)\left(-b^2+a^2\left(1+\mathrm{Tan}[e+f\,x]^2\right)\right)\right)+\left(3\,a\,A\left(a^2-b^2\right)\mathrm{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[e+f\,x]^2,-\frac{a^2\,\mathrm{Tan}[e+f\,x]^2}{a^2-b^2}\right]\left(1+\mathrm{Tan}[e+f\,x]^2\right)^{m/2}\right)\Big/$$

$$\left(\left(3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.$$

$$\left.\left.2a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\right)-$$

$$\left(3a^2\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\left(1+\text{Tan}[e+f x]^2\right)^{m/2}\right)\Big/$$

$$\left(b\left(3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.$$

$$\left.\left.\left.\left.2a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\right)\right)\right)\Big/$$

$$\left(f\left(\text{Sec}[e+f x]^2\left(\frac{A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]}{b}-\frac{a\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]}{b^2}+\right.\right.\right.$$

$$\frac{B\,\text{Hypergeometric2F1}\left[\frac{1}{2},1-\frac{m}{2},\frac{3}{2},-\text{Tan}[e+f x]^2\right]}{b}+$$

$$\left(3a^2A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\left(1+\text{Tan}[e+f x]^2\right)^{\frac{1+m}{2}}\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.$$

$$\left.\left.\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\right)-$$

$$\left(3a^3\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\left(1+\text{Tan}[e+f x]^2\right)^{\frac{1+m}{2}}\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.$$

$$\left(a^2-b^2\right)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1-m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\Big)\,\text{Tan}[e+f\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)+$$

$$\Big(3\,a\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,-\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{m/2}\Big)\Big/$$

$$\Big(\Big(3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,-\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\Big(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1-\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\right.$$

$$\left.-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,-\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\Big)\,\text{Tan}[e+f\,x]^2\Big)$$

$$\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)-\Big(3\,a^2\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},\,-\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]$$

$$\left(1+\text{Tan}[e+f\,x]^2\right)^{m/2}\Big)\Big/\Big(b\,\Big(3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,-\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+$$

$$\Big(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1-\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-$$

$$2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,-\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\Big)\,\text{Tan}[e+f\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)\Big)+$$

$$\text{Tan}[e+f\,x]\,\Big(-\Big(6\,a^4\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1-m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]$$

$$\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1+m}{2}}\Big)\Big/\Big(b\,\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1-m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+$$

$$\Big(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1-m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\left(a^2-b^2\right)\,(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2},\,\frac{1-m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\Big)\,\text{Tan}[e+f\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\Big)+$$

$$\Big(6\,a^5\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1-m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1+m}{2}}\Big)\Big/$$

$$\Big(b^2\,\Big(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1-m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+$$

$$\Big(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1-m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-$$

$$\left(a^2-b^2\right)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1-m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\Big)\,\text{Tan}[e+f\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\Big)-$$

$$\left(6\,a^3\,A\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{m/2}\right)\Big/$$
$$\left(\left(3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\right.$$
$$\left.\left.2\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\Big)+$$
$$\left(6\,a^4\,\left(a^2-b^2\right)\,B\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,\left(1+\text{Tan}[e+f\,x]^2\right)^{m/2}\right)\Big/$$
$$\left(b\,\left(3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\right.$$
$$\left.\left.2\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)^2\Big)+$$
$$\left(3\,a^2\,A\,\left(a^2-b^2\right)\,\left(-\frac{1}{3}\,(-1-m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}\,(-1-m),1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]+\right.\right.$$
$$\left.1\Big/\left(3\,\left(-a^2+b^2\right)\right)2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}\,(-1-m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\right)$$
$$\left.\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1+m}{2}}\right)\Big/\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}\,(-1-m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}\,(-1-m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\right.$$
$$\left.\left.\left(a^2-b^2\right)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[e+f\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[e+f\,x]^2\right)\right)\Big)-$$
$$\left(3\,a^3\,\left(a^2-b^2\right)\,B\,\left(-\frac{1}{3}\,(-1-m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}\,(-1-m),1,\frac{5}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]+\right.\right.$$
$$\left.1\Big/\left(3\,\left(-a^2+b^2\right)\right)2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}\,(-1-m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\right)$$
$$\left.\left(1+\text{Tan}[e+f\,x]^2\right)^{\frac{1+m}{2}}\right)\Big/\left(b^2\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}\,(-1-m),1,\frac{3}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}\,(-1-m),2,\frac{5}{2},-\text{Tan}[e+f\,x]^2,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\right]-\right.$$

$$\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\Big)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Big)+$$

$$\Big(3 a^2 A\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]$$

$$\left(1+\text{Tan}[e+f x]^2\right)^{-1+\frac{1+m}{2}}\Big)\Big/\Big(b\Big(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+$$

$$\Big(2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-$$

$$\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\Big)\text{Tan}[e+f x]^2\Big)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Big)-$$

$$\Big(3 a^3\left(a^2-b^2\right)B(1+m)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]$$

$$\left(1+\text{Tan}[e+f x]^2\right)^{-1+\frac{1+m}{2}}\Big)\Big/\Big(b^2\Big(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+$$

$$\Big(2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-$$

$$\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\Big)\text{Tan}[e+f x]^2\Big)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Big)+$$

$$\Big(3 a A\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\left(1+\text{Tan}[e+f x]^2\right)^{-1+\frac{m}{2}}\Big)\Big/$$

$$\Big(\Big(3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+$$

$$\Big(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-$$

$$2 a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\Big)\text{Tan}[e+f x]^2\Big)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Big)-$$

$$\Big(3 a^2\left(a^2-b^2\right)B\,m\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\left(1+\text{Tan}[e+f x]^2\right)^{-1+\frac{m}{2}}\Big)\Big/$$

$$\Big(b\Big(3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+$$

$$\Big(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-$$

$$2 a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\Big)\text{Tan}[e+f x]^2\Big)\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Big)+$$

$$\Bigg(3\,a\,A\,(a^2-b^2)\,\Bigg(\frac{1}{3}\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1-\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]\,-$$

$$\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,-\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]}{3\,(a^2-b^2)}\Bigg)\,\big(1+\text{Tan}[e+f\,x]^2\big)^{m/2}\Bigg)\Big/$$

$$\Bigg(\Bigg(3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,-\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]+\Bigg((a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1-\frac{m}{2},\,1,\,\frac{5}{2},$$

$$-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]-2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,-\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[e+f\,x]^2\Bigg)$$

$$\big(-b^2+a^2\,\big(1+\text{Tan}[e+f\,x]^2\big)\big)\Bigg)-\Bigg(3\,a^2\,(a^2-b^2)\,B\,\Bigg(\frac{1}{3}\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1-\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\Big]$$

$$\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]+\frac{2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,-\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]}{3\,(-a^2+b^2)}\Bigg)$$

$$\big(1+\text{Tan}[e+f\,x]^2\big)^{m/2}\Bigg)\Big/\Bigg(b\,\Bigg(3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,-\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg((a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1-\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]-$$

$$2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,-\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[e+f\,x]^2\Bigg)\,\big(-b^2+a^2\,\big(1+\text{Tan}[e+f\,x]^2\big)\big)\Bigg)+$$

$$\frac{1}{b}B\,\text{Csc}[e+f\,x]\,\text{Sec}[e+f\,x]\,\Big(-\text{Hypergeometric2F1}\Big[\frac{1}{2},\,1-\frac{m}{2},\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2\Big]+\big(1+\text{Tan}[e+f\,x]^2\big)^{-1+\frac{m}{2}}\Big)+\frac{1}{b}$$

$$A\,\text{Csc}[e+f\,x]\,\text{Sec}[e+f\,x]\,\Big(-\text{Hypergeometric2F1}\Big[\frac{1}{2},\,\frac{1}{2}-\frac{m}{2},\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2\Big]+\big(1+\text{Tan}[e+f\,x]^2\big)^{-\frac{1}{2}+\frac{m}{2}}\Big)-\frac{1}{b^2}$$

$$a\,B\,\text{Csc}[e+f\,x]\,\text{Sec}[e+f\,x]\,\Big(-\text{Hypergeometric2F1}\Big[\frac{1}{2},\,\frac{1}{2}-\frac{m}{2},\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2\Big]+\big(1+\text{Tan}[e+f\,x]^2\big)^{-\frac{1}{2}+\frac{m}{2}}\Big)-$$

$$\Bigg(3\,a^2\,A\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1-m),\,1,\,\frac{3}{2},\,-\text{Tan}[e+f\,x]^2,\,\frac{a^2\,\text{Tan}[e+f\,x]^2}{-a^2+b^2}\Big]$$

$$\big(1+\text{Tan}[e+f\,x]^2\big)^{\frac{1+m}{2}}\,\Bigg(2\,\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1-m),\,2,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]-$$

$$(a^2-b^2)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1-m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[e+f\,x]^2,\,-\frac{a^2\,\text{Tan}[e+f\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Sec}[e+f\,x]^2\,\text{Tan}[e+f\,x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1-m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1-m),1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)+$$

$$\text{Tan}[e+f x]^2\left(2\,a^2\left(-\frac{3}{5}(-1-m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1-m),2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1-m),3,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)-$$

$$\left(a^2-b^2\right)(1+m)\left(-\frac{3}{5}(1-m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1-m}{2},1,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.$$

$$\left.\left.\left.\left.\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1-m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)\right)\right)\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),\right.\right.\right.\right.$$

$$2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},\right.$$

$$\left.\left.\left.-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\right)^2\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\right)+$$

$$\left(3\,a^3\left(a^2-b^2\right)\text{B}\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\left(1+\text{Tan}[e+f x]^2\right)^{\frac{1+m}{2}}\right.$$

$$\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.\right.$$

$$\left.\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1-m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1-m),1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)+$$

$$\text{Tan}[e+f x]^2\left(2\,a^2\left(-\frac{3}{5}(-1-m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1-m),2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1-m),3,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)-$$

$$\left(a^2-b^2\right)(1+m)\left(-\frac{3}{5}(1-m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1-m}{2},1,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.$$

$$\left.\left.\left.\left.\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1-m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)\right)\right)\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1-m),1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1-m),\right.\right.\right.\right.$$

$$2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\left(a^2-b^2\right)(1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1-m}{2},1,\frac{5}{2},\right.$$

$$\left.\left.\left.-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\right)^2\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\right)-$$

$$\left(3\,a\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\left(1+\text{Tan}[e+f x]^2\right)^{m/2}\right.$$

$$\left(2\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.\right.$$

$$\left.2\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]+$$

$$3\left(a^2-b^2\right)\left(\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.$$

$$\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]}{3\left(a^2-b^2\right)}\right)+\text{Tan}[e+f x]^2$$

$$\left(\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},1-\frac{m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.\right.$$

$$\left.\frac{6}{5}\left(1-\frac{m}{2}\right)\text{AppellF1}\left[\frac{5}{2},2-\frac{m}{2},1,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)-$$

$$2\,a^2\left(\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1-\frac{m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\frac{1}{5\left(a^2-b^2\right)}\right.$$

$$\left.\left.\left.\left.12\,a^2\,\text{AppellF1}\left[\frac{5}{2},-\frac{m}{2},3,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)\right)\right)\right)\Big/$$

$$\left(\left(3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},\right.\right.\right.\right.$$

$$\left.\left.-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-2a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\Big)^2$$

$$\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\Big)+\left(3a^2\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,\frac{a^2\,\text{Tan}[e+f x]^2}{-a^2+b^2}\right]\right.$$

$$\left(1+\text{Tan}[e+f x]^2\right)^{m/2}\left(2\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]-\right.\right.$$

$$\left.2a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]+$$

$$3\left(a^2-b^2\right)\left(\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.$$

$$\left.\frac{2a^2\,\text{AppellF1}\left[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]}{3\left(a^2-b^2\right)}\right)+\text{Tan}[e+f x]^2$$

$$\left(\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}6a^2\,\text{AppellF1}\left[\frac{5}{2},1-\frac{m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\right.\right.$$

$$\left.\frac{6}{5}\left(1-\frac{m}{2}\right)\text{AppellF1}\left[\frac{5}{2},2-\frac{m}{2},1,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)-$$

$$2a^2\left(\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1-\frac{m}{2},2,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]-\frac{1}{5\left(a^2-b^2\right)}\right.$$

$$\left.\left.\left.\left.12a^2\,\text{AppellF1}\left[\frac{5}{2},-\frac{m}{2},3,\frac{7}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\text{Sec}[e+f x]^2\,\text{Tan}[e+f x]\right)\right)\right)\right)\Big/$$

$$\left(b\left(3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1-\frac{m}{2},1,\right.\right.\right.\right.$$

$$\frac{5}{2},-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\Big]-2a^2\,\text{AppellF1}\Big[\frac{3}{2},-\frac{m}{2},2,\frac{5}{2},$$

$$\left.\left.\left.\left.-\text{Tan}[e+f x]^2,-\frac{a^2\,\text{Tan}[e+f x]^2}{a^2-b^2}\right]\right)\text{Tan}[e+f x]^2\Big)^2\left(-b^2+a^2\left(1+\text{Tan}[e+f x]^2\right)\right)\right)\right)\right)$$

**Problem 641: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\text{Cos}[e+f\,x])^{3/2}\,(A+B\,\text{Cos}[e+f\,x])\,(c\,\text{Sec}[e+f\,x])^m\,dx$$

Optimal (type 9, 209 leaves, 2 steps):

$$\frac{2\,b\,B\,\text{Cos}[e+f\,x]\,\sqrt{a+b\,\text{Cos}[e+f\,x]}\,(c\,\text{Sec}[e+f\,x])^m\,\text{Sin}[e+f\,x]}{f\,(5-2\,m)}+\frac{1}{c\,(5-2\,m)}$$
$$2\,(c\,\text{Cos}[e+f\,x])^m\,(c\,\text{Sec}[e+f\,x])^m\,\text{Unintegrable}\Big[1\Big/\left(\sqrt{a+b\,\text{Cos}[e+f\,x]}\right)(c\,\text{Cos}[e+f\,x])^{-m}\left(\frac{1}{2}\,a\,c\left(2\,b\,B\,(1-m)+2\,a\,A\left(\frac{5}{2}-m\right)\right)+\right.$$
$$\left.\frac{1}{2}\,c\left(b^2\,B\,(3-2\,m)+a\,(2\,A\,b+a\,B)\,(5-2\,m)\right)\text{Cos}[e+f\,x]+\frac{1}{2}\,b\,c\,(A\,b\,(5-2\,m)+2\,a\,B\,(3-m))\,\text{Cos}[e+f\,x]^2\right),\,x\Big]$$

Result (type 1, 1 leaves):

???

---

# Test results for the 393 problems in "4.2.4.1 (a+b cos)^m (A+B cos+C cos^2).m"

- **Problem 5: Result more than twice size of optimal antiderivative.**

$$\int \left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 24 leaves, 2 steps):

$$\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{C\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 92 leaves):

$$-\frac{A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}$$

- **Problem 8: Result more than twice size of optimal antiderivative.**

$$\int \left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^7\,dx$$

Optimal (type 3, 98 leaves, 4 steps):

$$\frac{(5\,A+6\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{16\,d}+\frac{(5\,A+6\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{16\,d}+\frac{(5\,A+6\,C)\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{24\,d}+\frac{A\,\text{Sec}[c+d\,x]^5\,\text{Tan}[c+d\,x]}{6\,d}$$

Result (type 3, 445 leaves):

$$-\frac{5\,A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{16\,d}-\frac{3\,C\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{5\,A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{16\,d}+\frac{3\,C\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{A}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^6}+$$
$$\frac{A}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{C}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{5\,A}{32\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{3\,C}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{A}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^6}-\frac{A}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}-$$
$$\frac{C}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}-\frac{5\,A}{32\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{3\,C}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}$$

- **Problem 34: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (b\,\mathrm{Cos}[c+d\,x])^m\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 5, 117 leaves, 2 steps):

$$\frac{C\,(b\,\mathrm{Cos}[c+d\,x])^{1+m}\,\mathrm{Sin}[c+d\,x]}{b\,d\,(2+m)}-\frac{(C\,(1+m)+A\,(2+m))\,(b\,\mathrm{Cos}[c+d\,x])^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1+m}{2},\,\frac{3+m}{2},\,\mathrm{Cos}[c+d\,x]^2\right]\,\mathrm{Sin}[c+d\,x]}{b\,d\,(1+m)\,(2+m)\,\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

Result (type 5, 294 leaves):

$$\frac{1}{4\,d}(b\,\mathrm{Cos}[c+d\,x])^m$$
$$\left(1/(2+m)\,i\,2^{-m}\,C\,e^{-2\,i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{-m}\,\left(e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)\right)^m\,\mathrm{Cos}[c+d\,x]^{-m}\,\mathrm{Hypergeometric2F1}\left[-1-\frac{m}{2},\,-m,\,-\frac{m}{2},\,-e^{2\,i\,(c+d\,x)}\right]+\right.$$
$$1/(-2+m)\,i\,2^{-m}\,C\,e^{2\,i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{-m}\,\left(e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)\right)^m\,\mathrm{Cos}[c+d\,x]^{-m}\,\mathrm{Hypergeometric2F1}\left[1-\frac{m}{2},\,-m,\,2-\frac{m}{2},\,-e^{2\,i\,(c+d\,x)}\right]-$$
$$\left.\frac{2\,(2\,A+C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1+m}{2},\,\frac{3+m}{2},\,\mathrm{Cos}[c+d\,x]^2\right]\,\sqrt{\mathrm{Sin}[c+d\,x]^2}}{1+m}\right)$$

- **Problem 66: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]}{\sqrt{b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 71 leaves, 4 steps):

$$-\frac{2 (A-C) \sqrt{b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{b d \sqrt{\operatorname{Cos}[c+d x]}}+\frac{2 A \operatorname{Sin}[c+d x]}{d \sqrt{b \operatorname{Cos}[c+d x]}}$$

Result (type 5, 200 leaves):

$$-\frac{1}{3 d \sqrt{b \operatorname{Cos}[c+d x]}} \operatorname{Csc}[c] \left(-6 A \operatorname{Cos}[d x]+3 C \operatorname{Cos}[d x]+3 C \operatorname{Cos}[2 c+d x]+\right.$$
$$3 (A-C) \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] (\operatorname{Cos}[d x]-i \operatorname{Sin}[d x]) \sqrt{1+\operatorname{Cos}[2 (c+d x)]+i \operatorname{Sin}[2 (c+d x)]}+$$
$$\left.(A-C) \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] (\operatorname{Cos}[d x]+i \operatorname{Sin}[d x]) \sqrt{1+\operatorname{Cos}[2 (c+d x)]+i \operatorname{Sin}[2 (c+d x)]}\right)$$

## Problem 67: Result unnecessarily involves higher level functions.

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^2}{\sqrt{b \operatorname{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 73 leaves, 4 steps):

$$\frac{2 (A+3 C) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{3 d \sqrt{b \operatorname{Cos}[c+d x]}}+\frac{2 A b \operatorname{Sin}[c+d x]}{3 d (b \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 5, 141 leaves):

$$-\left(4 b \left(A+C \operatorname{Cos}[c+d x]^2\right)\right.$$
$$\left((A+3 C) \operatorname{Cos}[c+d x]^2 \sqrt{\operatorname{Cos}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2} \operatorname{Csc}[c] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\right.$$
$$\left.\left.\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]-A \sqrt{\operatorname{Csc}[c]^2} \operatorname{Sin}[c+d x]\right)\right) \Big/ \left(3 d (b \operatorname{Cos}[c+d x])^{3/2} (2 A+C+C \operatorname{Cos}[2 (c+d x)]) \sqrt{\operatorname{Csc}[c]^2}\right)$$

## Problem 68: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3}{\sqrt{b \operatorname{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 112 leaves, 5 steps):

$$-\frac{2 (3 A+5 C) \sqrt{b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{5 b d \sqrt{\operatorname{Cos}[c+d x]}}+\frac{2 A b^2 \operatorname{Sin}[c+d x]}{5 d (b \operatorname{Cos}[c+d x])^{5/2}}+\frac{2 (3 A+5 C) \operatorname{Sin}[c+d x]}{5 d \sqrt{b \operatorname{Cos}[c+d x]}}$$

Result (type 5, 522 leaves):

$$
\begin{aligned}
&b\left(-\frac{1}{10\,(b\,\text{Cos}[c+d\,x])^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}\,i\,(3\,A+5\,C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\right.\\
&\quad\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.\right.\\
&\qquad\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-\\
&\quad\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\\
&\qquad\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+\\
&\quad\left(\text{Cos}[c+d\,x]^4\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\,\left(\frac{4\,(3\,A+5\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{4\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{5\,d}+\right.\right.\\
&\qquad\left.\left.\left.\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(3\,A\,\text{Sin}[d\,x]+5\,C\,\text{Sin}[d\,x])}{5\,d}+\frac{4\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c]}{5\,d}\right)\right)\Big/\left((b\,\text{Cos}[c+d\,x])^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\right)\right)
\end{aligned}
$$

- **Problem 76: Result unnecessarily involves higher level functions.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 75 leaves, 4 steps):

$$\frac{2\,(A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,b\,d\,\sqrt{b\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sin}[c+d\,x]}{3\,d\,(b\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 5, 140 leaves):

$$
\begin{aligned}
&-\left(4\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\right.\\
&\quad\left((A+3\,C)\,\text{Cos}[c+d\,x]^2\,\sqrt{\text{Cos}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2}\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.\\
&\qquad\left.\left.\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]-A\,\sqrt{\text{Csc}[c]^2}\,\text{Sin}[c+d\,x]\right)\right)\Big/\left(3\,d\,(b\,\text{Cos}[c+d\,x])^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,(c+d\,x)])\,\sqrt{\text{Csc}[c]^2}\right)
\end{aligned}
$$

- **Problem 161: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(b\,\text{Cos}[c+d\,x])^{1/3}}\,dx$$

Optimal (type 5, 90 leaves, 3 steps):

$$\frac{3\,A\,\text{Sin}[c+d\,x]}{d\,(b\,\text{Cos}[c+d\,x])^{1/3}}+\frac{3\,(2\,A-C)\,(b\,\text{Cos}[c+d\,x])^{5/3}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{5}{6},\frac{11}{6},\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]}{5\,b^2\,d\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 283 leaves) :

$$-\left(\left(3\,e^{-i\,d\,x}\,\text{Cos}[c+d\,x]^{1/3}\,\text{Csc}[c]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\left(-8\,A\,\text{Cos}[d\,x]+2\,C\,\text{Cos}[d\,x]+2\,C\,\text{Cos}[2\,c+d\,x]+2\,(2\,A-C)\,\text{Hypergeometric2F1}\left[-\frac{1}{3},\frac{1}{3},\frac{2}{3},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right](\text{Cos}[d\,x]-i\,\text{Sin}[d\,x])\,(1+\text{Cos}[2\,(c+d\,x)]+i\,\text{Sin}[2\,(c+d\,x)])^{1/3}+(2\,A-C)\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{5}{3},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right](\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,(1+\text{Cos}[2\,(c+d\,x)]+i\,\text{Sin}[2\,(c+d\,x)])^{1/3}\right)\right)\Big/\left(4\times 2^{2/3}\,d\,(b\,\text{Cos}[c+d\,x])^{1/3}\left(e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)^{1/3}\right)\right)$$

## Problem 163: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3}{(b\,\text{Cos}[c+d\,x])^{1/3}}\,dx$$

Optimal (type 5, 92 leaves, 3 steps) :

$$\frac{3\,A\,b^2\,\text{Sin}[c+d\,x]}{7\,d\,(b\,\text{Cos}[c+d\,x])^{7/3}}+\frac{3\,(4\,A+7\,C)\,\text{Hypergeometric2F1}\left[-\frac{1}{6},\frac{1}{2},\frac{5}{6},\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]}{7\,d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 481 leaves) :

$$b\left(-\left(i\,(4\,A+7\,C)\,\text{Cos}[c+d\,x]^{10/3}\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)\left(-\left(3\,i\,e^{-i\,d\,x}\,\text{Hypergeometric2F1}\left[-\frac{1}{3},\frac{1}{3},\frac{2}{3},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\left(1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]\right)^{1/3}\right)\Big/\left(2^{2/3}\,d\left(e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)^{1/3}\right)-\left(3\,i\,e^{i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{5}{3},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\left(1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]\right)^{1/3}\right)\Big/\left(2\times 2^{2/3}\,d\left(e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)^{1/3}\right)\right)\right)\Big/\left(7\,(b\,\text{Cos}[c+d\,x])^{4/3}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\right)+\left(\text{Cos}[c+d\,x]^4\left(C+A\,\text{Sec}[c+d\,x]^2\right)\left(\frac{6\,(4\,A+7\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{7\,d}+\frac{6\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{7\,d}+\frac{6\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(4\,A\,\text{Sin}[d\,x]+7\,C\,\text{Sin}[d\,x])}{7\,d}+\frac{6\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c]}{7\,d}\right)\right)\Big/\left((b\,\text{Cos}[c+d\,x])^{4/3}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\right)\right)$$

- **Problem 167: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(b\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

Optimal (type 5, 90 leaves, 3 steps):

$$\frac{3\,A\,\text{Sin}[c+d\,x]}{2\,d\,(b\,\text{Cos}[c+d\,x])^{2/3}}+\frac{3\,(A-2\,C)\,(b\,\text{Cos}[c+d\,x])^{4/3}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{2}{3},\,\frac{5}{3},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{8\,b^2\,d\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 277 leaves):

$$-\left(\left(3\,e^{-i\,d\,x}\,\text{Cos}[c+d\,x]^{2/3}\,\text{Csc}[c]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\right.\right.$$
$$\left(10\,((-A+C)\,\text{Cos}[d\,x]+C\,\text{Cos}[2\,c+d\,x])+5\,(A-2\,C)\,\text{Hypergeometric2F1}\left[-\frac{1}{6},\,\frac{2}{3},\,\frac{5}{6},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.$$
$$(\text{Cos}[d\,x]-i\,\text{Sin}[d\,x])\,(1+\text{Cos}[2\,(c+d\,x)]+i\,\text{Sin}[2\,(c+d\,x)])^{2/3}+(A-2\,C)$$
$$\left.\left.\text{Hypergeometric2F1}\left[\frac{2}{3},\,\frac{5}{6},\,\frac{11}{6},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,(1+\text{Cos}[2\,(c+d\,x)]+i\,\text{Sin}[2\,(c+d\,x)])^{2/3}\right)\right)\Big/$$
$$\left.\left(10\times 2^{1/3}\,d\,(b\,\text{Cos}[c+d\,x])^{2/3}\,\left(e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)^{2/3}\right)\right)$$

- **Problem 169: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3}{(b\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

Optimal (type 5, 92 leaves, 3 steps):

$$\frac{3\,A\,b^2\,\text{Sin}[c+d\,x]}{8\,d\,(b\,\text{Cos}[c+d\,x])^{8/3}}+\frac{3\,(5\,A+8\,C)\,\text{Hypergeometric2F1}\left[-\frac{1}{3},\,\frac{1}{2},\,\frac{2}{3},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{16\,d\,(b\,\text{Cos}[c+d\,x])^{2/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 473 leaves):

$$b\left(-\left(\mathrm{i}\,(5A+8C)\,\mathrm{Cos}[c+d\,x]^{11/3}\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,(C+A\,\mathrm{Sec}[c+d\,x]^2)\right.\right.$$
$$\left(-\left(3\,\mathrm{i}\,e^{-\mathrm{i}\,d\,x}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{6},\frac{2}{3},\frac{5}{6},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\,\left(2+2\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+2\,\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]\right)^{2/3}\right)\Big/\right.$$
$$\left(d\,\left(e^{-\mathrm{i}\,d\,x}\,\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\mathrm{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\mathrm{Sin}[c]\right)\right)^{2/3}\right)-$$
$$\left(3\,\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{2}{3},\frac{5}{6},\frac{11}{6},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\,\left(2+2\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+2\,\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]\right)^{2/3}\right)\Big/$$
$$\left.\left.\left(5\,d\,\left(e^{-\mathrm{i}\,d\,x}\,\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\mathrm{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\mathrm{Sin}[c]\right)\right)^{2/3}\right)\right)\right)\Big/\left(32\,(b\,\mathrm{Cos}[c+d\,x])^{5/3}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$
$$\left(\mathrm{Cos}[c+d\,x]^4\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\,\left(\frac{3\,(5\,A+8\,C)\,\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{8\,d}+\frac{3\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Sin}[d\,x]}{4\,d}+\right.\right.$$
$$\left.\left.\left.\frac{3\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(5\,A\,\mathrm{Sin}[d\,x]+8\,C\,\mathrm{Sin}[d\,x])}{8\,d}+\frac{3\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c]}{4\,d}\right)\right)\Big/\left((b\,\mathrm{Cos}[c+d\,x])^{5/3}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)\right)$$

- **Problem 182: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a\,\mathrm{Cos}[c+d\,x])^m\,(b\,\mathrm{Cos}[c+d\,x])^n\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 5, 144 leaves, 3 steps):

$$\frac{C\,(a\,\mathrm{Cos}[c+d\,x])^{1+m}\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Sin}[c+d\,x]}{a\,d\,(2+m+n)}-$$
$$\left((C\,(1+m+n)+A\,(2+m+n))\,(a\,\mathrm{Cos}[c+d\,x])^{1+m}\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}\,(1+m+n),\frac{1}{2}\,(3+m+n),\mathrm{Cos}[c+d\,x]^2\right]\right.$$
$$\left.\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,d\,(1+m+n)\,(2+m+n)\,\sqrt{\mathrm{Sin}[c+d\,x]^2}\right)$$

Result (type 5, 459 leaves):

$$\frac{1}{4\,d}C\,\text{Cos}[c+d\,x]^{-m-n}\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n$$
$$\left(1/(2+m+n)\,i\,2^{-m-n}\,e^{-2\,i\,(c+d\,x)}\,\left(e^{-i\,(c+d\,x)}+e^{i\,(c+d\,x)}\right)^{m+n}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{-m-n}\,\text{Hypergeometric2F1}\left[-m-n,\,-1-\frac{m}{2}-\frac{n}{2},\,-\frac{m}{2}-\frac{n}{2},\,-e^{2\,i\,(c+d\,x)}\right]+\right.$$
$$\left.1/(-2+m+n)\,i\,2^{-m-n}\,e^{2\,i\,(c+d\,x)}\,\left(e^{-i\,(c+d\,x)}+e^{i\,(c+d\,x)}\right)^{m+n}\,\left(1+e^{2\,i\,(c+d\,x)}\right)^{-m-n}\,\text{Hypergeometric2F1}\left[-m-n,\,1-\frac{m}{2}-\frac{n}{2},\,2-\frac{m}{2}-\frac{n}{2},\,-e^{2\,i\,(c+d\,x)}\right]\right)-$$
$$\left(A\,\text{Cos}[c+d\,x]\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{2}\,(1+m+n),\,\frac{1}{2}\,(3+m+n),\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(d\,(1+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\left(C\,\text{Cos}[c+d\,x]\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{2}\,(1+m+n),\,\frac{1}{2}\,(3+m+n),\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(2\,d\,(1+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)$$

## Problem 183: Result more than twice size of optimal antiderivative.

$$\int \text{Cos}[c+d\,x]^2\,(b\,\text{Cos}[c+d\,x])^n\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 5, 117 leaves, 3 steps):

$$\frac{C\,(b\,\text{Cos}[c+d\,x])^{3+n}\,\text{Sin}[c+d\,x]}{b^3\,d\,(4+n)}-\frac{(C\,(3+n)+A\,(4+n))\,(b\,\text{Cos}[c+d\,x])^{3+n}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3+n}{2},\,\frac{5+n}{2},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{b^3\,d\,(3+n)\,(4+n)\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 342 leaves):

$$\frac{1}{8\,d}$$
$$(b\,\text{Cos}[c+d\,x])^n\,\text{Cot}[c+d\,x]\left(-\frac{C\,\text{Hypergeometric2F1}\left[-\frac{3}{2},\,\frac{1+n}{2},\,\frac{3+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{1+n}+\frac{4\,(A+C)\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\,\frac{1+n}{2},\,\frac{3+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{1+n}+\right.$$
$$\frac{6\,C\,\text{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\,\frac{3+n}{2},\,\frac{5+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{3+n}-\frac{4\,A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1+n}{2},\,\frac{3+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{1+n}-$$
$$\frac{3\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1+n}{2},\,\frac{3+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{1+n}-\frac{4\,A\,\text{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3+n}{2},\,\frac{5+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{3+n}-$$
$$\frac{4\,C\,\text{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3+n}{2},\,\frac{5+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{3+n}-$$
$$\left.\frac{C\,\text{Cos}[c+d\,x]^4\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{5+n}{2},\,\frac{7+n}{2},\,\text{Cos}[c+d\,x]^2\right]}{5+n}\right)\sqrt{\text{Sin}[c+d\,x]^2}$$

### ■ Problem 185: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (b \operatorname{Cos}[c+d x])^n \left(A+C \operatorname{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 117 leaves, 2 steps):

$$\frac{C\,(b \operatorname{Cos}[c+d x])^{1+n} \operatorname{Sin}[c+d x]}{b\,d\,(2+n)}-\frac{(C\,(1+n)+A\,(2+n))\,(b \operatorname{Cos}[c+d x])^{1+n} \operatorname{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+n}{2},\frac{3+n}{2},\operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{b\,d\,(1+n)\,(2+n)\,\sqrt{\operatorname{Sin}[c+d x]^2}}$$

Result (type 5, 294 leaves):

$$\frac{1}{4 d}(b \operatorname{Cos}[c+d x])^n$$
$$\left(1/(2+n)\, i\, 2^{-n}\, C\, e^{-2 i (c+d x)} \left(1+e^{2 i (c+d x)}\right)^{-n} \left(e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)\right)^n \operatorname{Cos}[c+d x]^{-n} \operatorname{Hypergeometric2F1}\left[-1-\frac{n}{2},-n,-\frac{n}{2},-e^{2 i (c+d x)}\right]+\right.$$
$$1/(-2+n)\, i\, 2^{-n}\, C\, e^{2 i (c+d x)} \left(1+e^{2 i (c+d x)}\right)^{-n} \left(e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)\right)^n \operatorname{Cos}[c+d x]^{-n} \operatorname{Hypergeometric2F1}\left[1-\frac{n}{2},-n,2-\frac{n}{2},-e^{2 i (c+d x)}\right]-$$
$$\left.\frac{2\,(2 A+C) \operatorname{Cot}[c+d x] \operatorname{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+n}{2},\frac{3+n}{2},\operatorname{Cos}[c+d x]^2\right] \sqrt{\operatorname{Sin}[c+d x]^2}}{1+n}\right)$$

### ■ Problem 190: Result more than twice size of optimal antiderivative.

$$\int \operatorname{Cos}[c+d x]^{5/2} (b \operatorname{Cos}[c+d x])^n \left(A+C \operatorname{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 142 leaves, 3 steps):

$$\frac{2 C \operatorname{Cos}[c+d x]^{7/2} (b \operatorname{Cos}[c+d x])^n \operatorname{Sin}[c+d x]}{d\,(9+2 n)}-$$
$$\left(2\,(C\,(7+2 n)+A\,(9+2 n)) \operatorname{Cos}[c+d x]^{7/2} (b \operatorname{Cos}[c+d x])^n \operatorname{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(7+2 n),\frac{1}{4}(11+2 n),\operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]\right)\Big/$$
$$\left(d\,(7+2 n)\,(9+2 n)\,\sqrt{\operatorname{Sin}[c+d x]^2}\right)$$

Result (type 5, 400 leaves):

$$\frac{1}{8\,d}\mathrm{Cos}[c+d\,x]^{3/2}\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Csc}[c+d\,x]\left(-\frac{2\,C\,\mathrm{Hypergeometric2F1}\left[-\frac{3}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{3+2\,n}+\right.$$
$$\frac{8\,(A+C)\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{3+2\,n}+$$
$$\frac{6\,C\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1}{4}(7+2\,n),\frac{1}{4}(11+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{\frac{7}{2}+n}-$$
$$\frac{8\,A\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{3+2\,n}-\frac{6\,C\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{3+2\,n}-$$
$$\frac{8\,A\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(7+2\,n),\frac{1}{4}(11+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{7+2\,n}-$$
$$\frac{8\,C\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(7+2\,n),\frac{1}{4}(11+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{7+2\,n}-$$
$$\left.\frac{2\,C\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(11+2\,n),\frac{1}{4}(15+2\,n),\mathrm{Cos}[c+d\,x]^2\right]}{11+2\,n}\right)\sqrt{\mathrm{Sin}[c+d\,x]^2}$$

- **Problem 198: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+a\,\mathrm{Cos}[e+f\,x])^m\,\left(A+C\,\mathrm{Cos}[e+f\,x]^2\right)\,dx$$

Optimal (type 5, 170 leaves, 4 steps):

$$-\frac{C\,(a+a\,\mathrm{Cos}[e+f\,x])^m\,\mathrm{Sin}[e+f\,x]}{f\,\left(2+3\,m+m^2\right)}+\frac{C\,(a+a\,\mathrm{Cos}[e+f\,x])^{1+m}\,\mathrm{Sin}[e+f\,x]}{a\,f\,(2+m)}+\frac{1}{f\,(1+m)\,(2+m)}$$
$$2^{\frac{1}{2}+m}\left(C\left(1+m+m^2\right)+A\left(2+3\,m+m^2\right)\right)(1+\mathrm{Cos}[e+f\,x])^{-\frac{1}{2}-m}\,(a+a\,\mathrm{Cos}[e+f\,x])^m\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}-m,\frac{3}{2},\frac{1}{2}(1-\mathrm{Cos}[e+f\,x])\right]\mathrm{Sin}[e+f\,x]$$

Result (type 5, 238 leaves):

$$\frac{1}{f\,(-2+m)\,m\,(2+m)}\,i\,4^{-1-m}\,e^{-2\,i\,(e+f\,x)}\left(1+e^{i\,(e+f\,x)}\right)^{-2\,m}\left(e^{-\frac{1}{2}\,i\,(e+f\,x)}\left(1+e^{i\,(e+f\,x)}\right)\right)^{2\,m}\mathrm{Cos}\left[\frac{1}{2}(e+f\,x)\right]^{-2\,m}$$
$$(a\,(1+\mathrm{Cos}[e+f\,x]))^m\left(C\,(-2+m)\,m\,\mathrm{Hypergeometric2F1}\left[-2-m,-2\,m,-1-m,-e^{i\,(e+f\,x)}\right]+e^{2\,i\,(e+f\,x)}\,(2+m)\right.$$
$$\left.\left(C\,e^{2\,i\,(e+f\,x)}\,m\,\mathrm{Hypergeometric2F1}\left[2-m,-2\,m,3-m,-e^{i\,(e+f\,x)}\right]+2\,(2\,A+C)\,(-2+m)\,\mathrm{Hypergeometric2F1}\left[-2\,m,-m,1-m,-e^{i\,(e+f\,x)}\right]\right)\right)$$

- **Problem 200: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{1/3}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 5, 135 leaves, 4 steps):

$$-\frac{9\,C\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Sin}[c+d\,x]}{28\,d}+\frac{3\,C\,(a+a\,\text{Cos}[c+d\,x])^{4/3}\,\text{Sin}[c+d\,x]}{7\,a\,d}+$$
$$\frac{(28\,A+13\,C)\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Hypergeometric2F1}\left[\frac{1}{6},\frac{1}{2},\frac{3}{2},\frac{1}{2}\,(1-\text{Cos}[c+d\,x])\right]\,\text{Sin}[c+d\,x]}{14\times 2^{1/6}\,d\,(1+\text{Cos}[c+d\,x])^{5/6}}$$

Result (type 5, 240 leaves) :

$$\frac{1}{112\,d}3\,(a\,(1+\text{Cos}[c+d\,x]))^{1/3}$$
$$\left(-4\,(28\,A+13\,C)\,\text{Cot}\left[\frac{c}{2}\right]+4\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]+\left((28\,A+13\,C)\,\text{Csc}\left[\frac{c}{4}\right]\,\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{3},\frac{1}{3},\frac{2}{3},-e^{i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])\right]+\right.\right.\right.$$
$$\left.\left.e^{i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{5}{3},-e^{i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])\right]\right)\,\text{Sec}\left[\frac{c}{4}\right]\,\left(1+e^{i\,d\,x}\,\text{Cos}[c]+i\,e^{i\,d\,x}\,\text{Sin}[c]\right)^{1/3}\right)\Big/$$
$$\left.\left(\left(1+e^{i\,d\,x}\right)\,\text{Cos}\left[\frac{c}{2}\right]+i\,\left(-1+e^{i\,d\,x}\right)\,\text{Sin}\left[\frac{c}{2}\right]\right)+8\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]+4\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]+8\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]\right)$$

- **Problem 202: Unable to integrate problem.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

Optimal (type 5, 138 leaves, 4 steps) :

$$\frac{3\,(A+C)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])^{2/3}}+\frac{3\,C\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Sin}[c+d\,x]}{4\,a\,d}-$$
$$\frac{(4\,A+7\,C)\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Hypergeometric2F1}\left[\frac{1}{6},\frac{1}{2},\frac{3}{2},\frac{1}{2}\,(1-\text{Cos}[c+d\,x])\right]\,\text{Sin}[c+d\,x]}{2\times 2^{1/6}\,a\,d\,(1+\text{Cos}[c+d\,x])^{5/6}}$$

Result (type 8, 29 leaves) :

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

- **Problem 208: Result more than twice size of optimal antiderivative.**

$$\int(a+b\,\text{Cos}[e+f\,x])^m\,\left(A+C\,\text{Cos}[e+f\,x]^2\right)\,dx$$

Optimal (type 6, 285 leaves, 8 steps) :

$$\frac{C\,(a+b\,\mathrm{Cos}[e+f\,x])^{1+m}\,\mathrm{Sin}[e+f\,x]}{b\,f\,(2+m)}-$$
$$\left(\sqrt{2}\;a\,(a+b)\;C\,\mathrm{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2},\,-1-m,\,\frac{3}{2},\,\frac{1}{2}\,(1-\mathrm{Cos}[e+f\,x]),\,\frac{b\,(1-\mathrm{Cos}[e+f\,x])}{a+b}\Big]\,(a+b\,\mathrm{Cos}[e+f\,x])^{m}\left(\frac{a+b\,\mathrm{Cos}[e+f\,x]}{a+b}\right)^{-m}\mathrm{Sin}[e+f\,x]\right)\Big/$$
$$\left(b^2\,f\,(2+m)\,\sqrt{1+\mathrm{Cos}[e+f\,x]}\right)+\left(\sqrt{2}\;\left(a^2\,C+b^2\,(C\,(1+m)+A\,(2+m))\right)\,\mathrm{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2},\,-m,\,\frac{3}{2},\,\frac{1}{2}\,(1-\mathrm{Cos}[e+f\,x]),\,\frac{b\,(1-\mathrm{Cos}[e+f\,x])}{a+b}\Big]\right.$$
$$\left.(a+b\,\mathrm{Cos}[e+f\,x])^{m}\left(\frac{a+b\,\mathrm{Cos}[e+f\,x]}{a+b}\right)^{-m}\mathrm{Sin}[e+f\,x]\right)\Big/\left(b^2\,f\,(2+m)\,\sqrt{1+\mathrm{Cos}[e+f\,x]}\right)$$

Result (type 6, 10 836 leaves) :

$$\left(6\,(a+b)\left(A\,(a+b\,\mathrm{Cos}[e+f\,x])^{m}+\frac{1}{2}\,C\,(a+b\,\mathrm{Cos}[e+f\,x])^{m}+\frac{1}{2}\,C\,(a+b\,\mathrm{Cos}[e+f\,x])^{m}\,\mathrm{Cos}[2\,(e+f\,x)]\right)\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]\right.$$
$$\left(a+\frac{b-b\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{1+\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}\right)^{m}\left(\left(A\,\mathrm{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\left(1+\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\right)^2\right)\Big/\right.$$
$$\left(3\,(a+b)\,\mathrm{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+\right.$$
$$2\,\left((a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-\right.$$
$$\left.\left.(a+b)\,(1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\right)\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\right)+$$
$$\left(C\,\mathrm{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\left(1+\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\right)^2\right)\Big/$$
$$\left(3\,(a+b)\,\mathrm{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+\right.$$
$$2\,\left((a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-\right.$$
$$\left.(a+b)\,(1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\right)\mathrm{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.\left.\left.(a+b)\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right)\right)\Big/$$

$$\left(f\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^3\left(\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^3}6\,(a+b)\,m\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\left(-\frac{b\,\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]}{1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}-\right.\right.\right.$$

$$\left.\frac{\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\left(b-b\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2}\right)\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}\right)^{-1+m}$$

$$\left(\left(A\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/\right.$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(3+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)-$$

$$\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^4}\,18\,(a+b)\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m$$

$$\left(\left(A\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/\right.$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(3+m)\right.$$

$$\left.\left.\left.\text{AppellF1}\left[\frac{3}{2},\,4+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)+$$

$$\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^3}\,3\,(a+b)\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}\right)^m$$

$$\left(\left(A\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\right)\Big/\right.$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)(3+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\Bigg)+$$

$$\frac{1}{\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^3} 6 (a+b) \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right] \left(a+\frac{b-b\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m$$

$$\left(\left(2 A \,\mathrm{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right.\right.$$

$$\left.\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right) \Big/ \left(3 (a+b) \mathrm{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b) m \,\mathrm{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\mathrm{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(2 C \,\mathrm{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right.$$

$$\left.\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right) \Big/ \left(3 (a+b) \mathrm{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b) m \,\mathrm{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\mathrm{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(A\left(1/(3(a+b))(a-b) m \,\mathrm{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.\right.$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(1+m) \mathrm{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right) \left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2 \Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(C\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$\left.\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(4\,C\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(4\,C\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(A\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right.$$

$$\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+3\,(a+b)\left(\frac{1}{3\,(a+b)}\right.$$

$$(a-b)\, m\, \text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] -$$

$$\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg) +$$

$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2 \Bigg((a-b)\, m \Bigg(-\frac{1}{5(a+b)} 3(a-b)(1-m)\,\text{AppellF1}\left[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left. -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2}, 2+m, 1-m, \frac{7}{2},\right.$$

$$\left. -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg) - (a+b)(1+m)$$

$$\Bigg(\frac{1}{5(a+b)} 3(a-b)\, m\, \text{AppellF1}\left[\frac{5}{2}, 2+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2}, 3+m, -m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg) \Bigg/ \Bigg(3(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left. -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] + 2\Bigg((a-b)\, m\, \text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] -$$

$$(a+b)(1+m)\,\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2 -$$

$$\Bigg(C\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2$$

$$\Bigg(2\Bigg((a-b)\, m\, \text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg) \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] +$$

$$3\,(a+b)\left(\frac{1}{3\,(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]-\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2$$

$$\left((a-b)\,m\left(-\frac{1}{5\,(a+b)}3\,(a-b)\,(1-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]-\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)-(a+b)\,(1+m)\left(\frac{1}{5\,(a+b)}3\,(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]-\frac{3}{5}(2+m)$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2},3+m,-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\right)\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)\right.$$

$$\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.\right.$$

$$\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3(a+b)\left(\frac{1}{3(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 2+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(2+m)\,\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((a-b)\,m\left(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\text{AppellF1}\left[\frac{5}{2}, 2+m, 2-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2}, 3+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)-(a+b)(2+m)\left(\frac{1}{5(a+b)}3(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$3+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(3+m)$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2}, 4+m, -m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 2+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\frac{3}{2}, 2+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-$$

$$\left.\left.(a+b)(2+m)\,\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2}, 3+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 3+m, 1-m,\right.\right.\right.\right.$$

$$\frac{5}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},\ 4+m,\ -m,\ \frac{5}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,$$

$$-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]+3\,(a+b)\,\Bigg(\frac{1}{3\,(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\ 3+m,\ 1-m,\right.$$

$$\frac{5}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},\ 4+m,\right.$$

$$-m,\ \frac{5}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\Bigg)+2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2$$

$$\Bigg((a-b)\,m\,\Bigg(-\frac{1}{5\,(a+b)}3\,(a-b)\,(1-m)\,\text{AppellF1}\left[\frac{5}{2},\ 3+m,\ 2-m,\ \frac{7}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{3}{5}\,(3+m)\,\text{AppellF1}\left[\frac{5}{2},\ 4+m,\ 1-m,\ \frac{7}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\Bigg)-(a+b)\,(3+m)\,\Bigg(\frac{1}{5\,(a+b)}3\,(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.$$

$$4+m,\ 1-m,\ \frac{7}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{3}{5}\,(4+m)$$

$$\text{AppellF1}\left[\frac{5}{2},\ 5+m,\ -m,\ \frac{7}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\ 3+m,\ -m,\ \frac{3}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[$$

$$\frac{3}{2},\ 3+m,\ 1-m,\ \frac{5}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\Big]-$$

$$(a+b)\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},\ 4+m,\ -m,\ \frac{5}{2},\ -\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\ -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\Bigg)^2\Bigg)\Bigg)\Bigg)\Bigg)$$

- **Problem 215: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(b\,\text{Cos}[c+d\,x])^{4/3}}\,dx$$

Optimal (type 5, 173 leaves, 5 steps):

$$-\frac{3\,B\,\mathrm{Cos}[c+d\,x]^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{6}\,(2+3\,m),\frac{1}{6}\,(8+3\,m),\mathrm{Cos}[c+d\,x]^2\right]\,\mathrm{Sin}[c+d\,x]}{b\,d\,(2+3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\sqrt{\mathrm{Sin}[c+d\,x]^2}}-\frac{3\,C\,\mathrm{Cos}[c+d\,x]^{2+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{6}\,(5+3\,m),\frac{1}{6}\,(11+3\,m),\mathrm{Cos}[c+d\,x]^2\right]\,\mathrm{Sin}[c+d\,x]}{b\,d\,(5+3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

Result (type 6, 4959 leaves):

$$\left(2\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{\frac{5}{3}+m}\mathrm{Cos}[c+d\,x]^{4/3}\left(\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}\right.$$
$$\left(\frac{1}{2}C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+B\,\mathrm{Cos}[c+d\,x]^{\frac{5}{3}+m}+\frac{1}{2}C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Cos}[2(c+d\,x)]+\frac{1}{2}\,i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Sin}[2(c+d\,x)]+\right.$$
$$\mathrm{Sec}[c+d\,x]\left(-\frac{1}{2}\,i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Cos}[2(c+d\,x)]\,\mathrm{Sin}[c+d\,x]+B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Sin}[c+d\,x]^2+\right.$$
$$\left.\left.\mathrm{Sin}[c+d\,x]\left(-\frac{1}{2}\,i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\mathrm{Sin}[2(c+d\,x)]\right)\right)\right)$$
$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(\left(9\,(B+C)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\right.$$
$$\left(9\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\left(-(5+3\,m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-3\,m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(5\,(-B+C)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$
$$\left(-15\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\left((5+3\,m)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.$$
$$\left.\left.\left.\left.-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+3\,m)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)\Big/$$
$$\left(d\,(b\,\mathrm{Cos}[c+d\,x])^{4/3}\left(\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{\frac{2}{3}+m}\left(\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}\right.\right.$$
$$\left(\left(9\,(B+C)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(9\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.\right.$$
$$-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\left(-(5+3\,m)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$(1-3 m)\, \text{AppellF1}\Big[\frac{3}{2}, \frac{4}{3}-m, \frac{5}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Big) \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big) +$$

$$\Big(5 (-B+C)\, \text{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big) \Big/$$

$$\Big(-15\, \text{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] +$$

$$2 \Big((5+3 m)\, \text{AppellF1}\Big[\frac{5}{2}, \frac{1}{3}-m, \frac{8}{3}+m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] +$$

$$(-1+3 m)\, \text{AppellF1}\Big[\frac{5}{2}, \frac{4}{3}-m, \frac{5}{3}+m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Big) \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)\Big) -$$

$$2 \Big(\frac{5}{3}+m\Big) \Big(\text{Cos}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^{\frac{2}{3}+m} \Big(\text{Cos}[c+d x]\, \text{Sec}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^{-\frac{1}{3}+m} \text{Sin}\Big[\frac{1}{2} (c+d x)\Big]^2$$

$$\Big(\Big(9 (B+C)\, \text{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Big) \Big/ \Big(9\, \text{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] + 2 \Big(-(5+3 m)\, \text{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}-m, \frac{8}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] +$$

$$(1-3 m)\, \text{AppellF1}\Big[\frac{3}{2}, \frac{4}{3}-m, \frac{5}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Big) \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big) +$$

$$\Big(5 (-B+C)\, \text{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big) \Big/$$

$$\Big(-15\, \text{AppellF1}\Big[\frac{3}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{5}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] +$$

$$2 \Big((5+3 m)\, \text{AppellF1}\Big[\frac{5}{2}, \frac{1}{3}-m, \frac{8}{3}+m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] +$$

$$(-1+3 m)\, \text{AppellF1}\Big[\frac{5}{2}, \frac{4}{3}-m, \frac{5}{3}+m, \frac{7}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Big) \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)\Big) +$$

$$2 \Big(-\frac{1}{3}+m\Big) \Big(\text{Cos}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^{\frac{5}{3}+m} \Big(\text{Cos}[c+d x]\, \text{Sec}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^{-\frac{4}{3}+m} \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]$$

$$\Big(-\text{Sec}\Big[\frac{1}{2} (c+d x)\Big]^2 \text{Sin}[c+d x] + \text{Cos}[c+d x]\, \text{Sec}\Big[\frac{1}{2} (c+d x)\Big]^2 \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]\Big)$$

$$\Big(\Big(9 (B+C)\, \text{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Big) \Big/$$

$$\Big(9\, \text{AppellF1}\Big[\frac{1}{2}, \frac{1}{3}-m, \frac{5}{3}+m, \frac{3}{2}, \text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2, -\text{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] +$$

$$2\,\Big(-(5+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(1-3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(5\,(-B+C)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big/$$

$$\Big(-15\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-1+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)+$$

$$2\,\Big(\text{Cos}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{\frac{5}{3}+m}\,\Big(\text{Cos}[c+d\,x]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{1}{3}+m}\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]$$

$$\Big(\Big(9\,(B+C)\,\Big(-\frac{1}{3}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{1}{3}\,\Big(\frac{1}{3}-m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big/$$

$$\Big(9\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$2\,\Big(-(5+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(1-3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(5\,(-B+C)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big/$$

$$\Big(-15\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-1+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},$$

$$\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+\Big(5\,(-B+C)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2$$

$$\Big(-\frac{3}{5}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{3}{5}\,\Big(\frac{1}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big/$$

$$\Big(-15\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]+2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},$$

$$\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]+(-1+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\Big)$$

$$\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big)-\Big(9\,(B+C)\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]$$

$$\Big(2\,\Big(-(5+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]+$$

$$(1-3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+$$

$$9\,\Big(-\frac{1}{3}\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+$$

$$\frac{1}{3}\Big(\frac{1}{3}-m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big)+$$

$$2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\Big(-(5+3\,m)\,\Big(-\frac{3}{5}\Big(\frac{8}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+\frac{3}{5}\Big(\frac{1}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},$$

$$\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big)+(1-3\,m)$$

$$\Big(-\frac{3}{5}\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+$$

$$\frac{3}{5}\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big(9\,\text{AppellF1}\Big[\frac{1}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]+2\,\Big(-(5+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},$$

$$\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]+(1-3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\Big)$$

$$\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big)^2-\Big(5\,(-B+C)\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]$$

$$\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\Big(2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]+$$

$$(-1+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-$$

$$15\,\Big(-\frac{3}{5}\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]+$$

$$\frac{3}{5}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg((5+3m)\Bigg(-\frac{5}{7}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{5}{7}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)+(-1+3m)$$

$$\Bigg(-\frac{5}{7}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$\frac{5}{7}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+2\Bigg((5+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\right.$$

$$\left.\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-1+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)^2\Bigg)\Bigg)$$

## Problem 224: Result more than twice size of optimal antiderivative.

$$\int \text{Cos}[c+dx]^{5/2}\,(b\,\text{Cos}[c+dx])^n\left(B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)dx$$

Optimal (type 5, 163 leaves, 5 steps):

$$-\left(2\,B\,\text{Cos}[c+dx]^{9/2}\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(9+2n),\frac{1}{4}(13+2n),\text{Cos}[c+dx]^2\right]\text{Sin}[c+dx]\right)\Big/$$

$$\left(d\,(9+2n)\sqrt{\text{Sin}[c+dx]^2}\right)-$$

$$\left(2\,C\,\text{Cos}[c+dx]^{11/2}\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(11+2n),\frac{1}{4}(15+2n),\text{Cos}[c+dx]^2\right]\text{Sin}[c+dx]\right)\Big/$$

$$\left(d\,(11+2n)\sqrt{\text{Sin}[c+dx]^2}\right)$$

Result (type 5, 450 leaves):

$$\frac{1}{8\,d}\operatorname{Cos}[c+d\,x]^{3/2}\,(b\operatorname{Cos}[c+d\,x])^n\operatorname{Csc}[c+d\,x]$$

$$\left(-\frac{2\,C\,\text{Hypergeometric2F1}\left[-\frac{3}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{3+2\,n}+\frac{8\,C\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{3+2\,n}+\right.$$

$$\frac{6\,B\operatorname{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1}{4}(5+2\,n),\frac{1}{4}(9+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{\frac{5}{2}+n}+$$

$$\frac{6\,C\operatorname{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1}{4}(7+2\,n),\frac{1}{4}(11+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{\frac{7}{2}+n}-$$

$$\frac{6\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{3+2\,n}-$$

$$\frac{6\,B\operatorname{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(5+2\,n),\frac{1}{4}(9+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{\frac{5}{2}+n}-$$

$$\frac{8\,C\operatorname{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(7+2\,n),\frac{1}{4}(11+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{7+2\,n}-$$

$$\frac{4\,B\operatorname{Cos}[c+d\,x]^3\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(9+2\,n),\frac{1}{4}(13+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{9+2\,n}-$$

$$\left.\frac{2\,C\operatorname{Cos}[c+d\,x]^4\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(11+2\,n),\frac{1}{4}(15+2\,n),\operatorname{Cos}[c+d\,x]^2\right]}{11+2\,n}\right)\sqrt{\operatorname{Sin}[c+d\,x]^2}$$

- **Problem 228: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\operatorname{Cos}[c+d\,x])^n\left(B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[c+d\,x]^2\right)}{\operatorname{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 5, 163 leaves, 5 steps):

$$-\left(2\,B\sqrt{\operatorname{Cos}[c+d\,x]}\,(b\operatorname{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(1+2\,n),\frac{1}{4}(5+2\,n),\operatorname{Cos}[c+d\,x]^2\right]\operatorname{Sin}[c+d\,x]\right)\bigg/\left(d\,(1+2\,n)\sqrt{\operatorname{Sin}[c+d\,x]^2}\right)-$$

$$\left(2\,C\operatorname{Cos}[c+d\,x]^{3/2}\,(b\operatorname{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\operatorname{Cos}[c+d\,x]^2\right]\operatorname{Sin}[c+d\,x]\right)\bigg/\left(d\,(3+2\,n)\sqrt{\operatorname{Sin}[c+d\,x]^2}\right)$$

Result (type 6, 4951 leaves):

$$\left(2\left(\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{\frac{3}{2}+n}\operatorname{Cos}[c+d\,x]^{-n}\,(b\operatorname{Cos}[c+d\,x])^n\left(\operatorname{Cos}[c+d\,x]\operatorname{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}\right.$$

$$\left(\frac{1}{2} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}+B \operatorname{Cos}[c+d x]^{\frac{3}{2}+n}+\frac{1}{2} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[2 (c+d x)]+\frac{1}{2} i C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[2 (c+d x)]+\right.$$
$$\operatorname{Sec}[c+d x]\left(-\frac{1}{2} i C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[2 (c+d x)] \operatorname{Sin}[c+d x]+B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[c+d x]^2+\right.$$
$$\left.\left.\operatorname{Sin}[c+d x]\left(-\frac{1}{2} i C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[2 (c+d x)]\right)\right)\right)$$
$$\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\left(\left(9 (B+C) \operatorname{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\right.$$
$$\left(3 \operatorname{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left(-(3+2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(1-2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$
$$\left(5 (-B+C) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$
$$\left(-5 \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((3+2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.$$
$$\left.\left.\left.\left.-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-1+2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\Big/$$
$$\left(3 d\left(\frac{1}{3}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{1}{2}+n}\left(\operatorname{Cos}[c+d x] \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{1}{2}+n}\left(\left(9 (B+C) \operatorname{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.\right.\right.$$
$$\left.\left.-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\left(3 \operatorname{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left(-(3+2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.(1-2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$
$$\left(5 (-B+C) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/\left(-5\right.$$
$$\operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((3+2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.$$
$$\left.\left.\left.-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-1+2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)-$$
$$\frac{2}{3}\left(\frac{3}{2}+n\right)\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{1}{2}+n}\left(\operatorname{Cos}[c+d x] \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{1}{2}+n} \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\left(\left(9\,(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\right.\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+\left(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5\,(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.\left.(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{2}{3}\left(-\frac{1}{2}+n\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{\frac{3}{2}+n}\left(\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{3}{2}+n}\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]$$

$$\left(-\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sin}[c+d\,x]+\text{Cos}[c+d\,x]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

$$\left(\left(9\,(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left(-(3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5\,(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.\left.(-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{2}{3}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\right)^{\frac{3}{2}+n}\left(\text{Cos}[c+d x]\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{1}{2}+n}\text{Tan}\left[\frac{1}{2}(c+d x)\right]$$

$$\Bigg(\Bigg(9(B+C)\left(-\frac{1}{3}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Bigg(-(3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)+$$

$$\Bigg(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Bigg((3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-1+2n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{3}{2}-n,$$

$$\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)+\Bigg(5(-B+C)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Bigg((3+2n)\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]+(-1+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)-\Bigg(9(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\Bigg(\Bigg(-(3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$3\left(-\frac{1}{3}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg(-(3+2n)\Bigg(-\frac{3}{5}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+(1-2n)$$

$$\Bigg(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Bigg(-(3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)^2-\Bigg(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg(\Bigg(\Bigg((3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]-$$

$$5\Bigg(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg((3+2n)\Bigg(-\frac{5}{7}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{5}{7}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+(-1+2n)$$

$$\Bigg(-\frac{5}{7}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$\frac{5}{7}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-1+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2\Bigg)\Bigg)\Bigg)$$

- **Problem 229: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+d x])^n\left(B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{5/2}}\,dx$$

Optimal (type 5, 163 leaves, 5 steps):

$$\frac{2\,B\,(b\,\text{Cos}[c+d x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-1+2 n),\frac{1}{4}(3+2 n),\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{d\,(1-2 n)\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sin}[c+d x]^2}}-\left(2\,C\sqrt{\text{Cos}[c+d x]}\,(b\,\text{Cos}[c+d x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(1+2 n),\frac{1}{4}(5+2 n),\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]\right)\Big/\left(d\,(1+2 n)\sqrt{\text{Sin}[c+d x]^2}\right)$$

Result (type 6, 4842 leaves):

$$\Bigg(6\sqrt{\text{Cos}[c+d x]}\,(b\,\text{Cos}[c+d x])^n\left(B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}+\text{Sec}[c+d x]\left(\frac{1}{2}C\,\text{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2}C\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Cos}[2(c+d x)]+\frac{1}{2}\,i\,C\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Sin}[2(c+d x)]\right)+\text{Sec}[c+d x]^2\left(-\frac{1}{2}\,i\,C\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Cos}[2(c+d x)]\,\text{Sin}[c+d x]+B\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Sin}[c+d x]^2+\text{Sin}[c+d x]\left(-\frac{1}{2}\,i\,C\,\text{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2}C\,\text{Cos}[c+d x]^{\frac{1}{2}+n}\text{Sin}[2(c+d x)]\right)\right)\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]$$

$$\Bigg(\Bigg(\left((B-C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\Bigg((1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(-3+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)\Big)\Big/$$

$$\Bigg(d\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^2\,\Bigg(-\frac{1}{\Big(-1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\Big)^3}\,12\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2$$

$$\Big(\Big((B-C)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-$$

$$n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-\Big((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(2\,B\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-\Big((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-3+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)+$$

$$\frac{1}{\Big(-1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\Big)^2}\,3\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(\Big((B-C)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\Big(-1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-$$

$$\Big((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-1+2\,n)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(2\,B\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-\Big((1+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-3+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{5}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)-$$

$$\frac{1}{\Big(-1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2\Big)^2}\,6\,\Big(\frac{1}{2}+n\Big)\,\text{Cos}[c+d\,x]^{-\frac{1}{2}+n}\,\text{Sin}[c+d\,x]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]$$

$$\left(\left((B-C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/\right.$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$
$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\right.\right.$$
$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.\left.(-3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$
$$\frac{1}{\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\,6\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(\left((B-C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$
$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$
$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left((B-C)\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$
$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$
$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$
$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(2\,B\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$

$$\frac{1}{3}\left(\frac{3}{2}-n\right) \text{AppellF1}\left[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Big)\Big)\Big) \Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] -$$

$$\Big((1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + (-3+2 n)$$

$$\text{AppellF1}\left[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) -$$

$$\Big((B-C)\,\text{AppellF1}\left[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)$$

$$\Big(-\Big((1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + (-1+2 n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Big) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + 3\Big(-\frac{1}{3}\left(\frac{1}{2}+n\right) \text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{1}{3}\left(\frac{1}{2}-n\right) \text{AppellF1}\Big[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,$$

$$\frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Big) - \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \Big((1+2 n) \Big(-\frac{3}{5}\left(\frac{3}{2}+n\right)$$

$$\text{AppellF1}\left[\frac{5}{2},\ \frac{1}{2}-n,\ \frac{5}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{1}{2}-n\right)$$

$$\text{AppellF1}\left[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Big) + (-1+2 n)$$

$$\Big(-\frac{3}{5}\left(\frac{1}{2}+n\right) \text{AppellF1}\left[\frac{5}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$\frac{3}{5}\left(\frac{3}{2}-n\right) \text{AppellF1}\left[\frac{5}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{7}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Big)\Big)\Big)\Big)\Big) \Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] - \Big((1+2 n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] + (-1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)^2 - \Big(2 B\,\text{AppellF1}\left[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\Big(-\Big((1+2 n)\,\text{AppellF1}\left[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + (-3+2 n)$$

$$\text{AppellF1}\left[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\ -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{1}{3}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left((1+2n)\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-3+2n)\left(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\right)\Bigg/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2\Bigg)\Bigg)$$

## Problem 230: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{(b\,\text{Cos}[c+dx])^n\left(B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\text{Cos}[c+dx]^{7/2}}\,dx$$

Optimal (type 5, 163 leaves, 5 steps):

$$\frac{2B\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-3+2n),\frac{1}{4}(1+2n),\text{Cos}[c+dx]^2\right]\text{Sin}[c+dx]}{d\,(3-2n)\,\text{Cos}[c+dx]^{3/2}\sqrt{\text{Sin}[c+dx]^2}}+\frac{2C\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-1+2n),\frac{1}{4}(3+2n),\text{Cos}[c+dx]^2\right]\text{Sin}[c+dx]}{d\,(1-2n)\sqrt{\text{Cos}[c+dx]}\sqrt{\text{Sin}[c+dx]^2}}$$

Result (type 6, 4948 leaves):

$$\Bigg(2\,\text{Cos}[c+dx]^{-n}\,(b\,\text{Cos}[c+dx])^n$$

$$\left(B\,\text{Cos}[c+dx]^{-\frac{1}{2}+n}+\text{Sec}[c+dx]^2\left(\frac{1}{2}C\,\text{Cos}[c+dx]^{\frac{1}{2}+n}+\frac{1}{2}C\,\text{Cos}[c+dx]^{\frac{1}{2}+n}\,\text{Cos}[2(c+dx)]+\frac{1}{2}i\,C\,\text{Cos}[c+dx]^{\frac{1}{2}+n}\,\text{Sin}[2(c+dx)]\right)+\right.$$

$$\text{Sec}[c+d x]^3 \left(-\frac{1}{2} i\, C \,\text{Cos}[c+d x]^{\frac{1}{2}+n} \text{Cos}[2 (c+d x)] \,\text{Sin}[c+d x]+B \,\text{Cos}[c+d x]^{\frac{1}{2}+n} \text{Sin}[c+d x]^2+\right.$$

$$\left.\text{Sin}[c+d x] \left(-\frac{1}{2} i\, C \,\text{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2} C \,\text{Cos}[c+d x]^{\frac{1}{2}+n} \text{Sin}[2 (c+d x)]\right)\right)\Bigg) \text{Tan}\left[\frac{1}{2} (c+d x)\right] \left(1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)^{-\frac{5}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}\right)^{-\frac{1}{2}+n} \left(\left(9 (B+C) \,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right)\right/$$

$$\left(3 \,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+\left((1-2 n) \,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+(5-2 n) \,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)+$$

$$\left(5 (-B+C) \,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)\right/$$

$$\left(-5 \,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+\left((-1+2 n) \,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,\right.\right.\right.$$

$$\left.\left.\left.\left.-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+(-5+2 n) \,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)\right)\right/$$

$$\left(3 d \left(-\frac{2}{3} \left(-\frac{5}{2}+n\right) \text{Sec}\left[\frac{1}{2} (c+d x)\right]^2 \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2 \left(1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)^{-\frac{7}{2}+n} \left(\frac{1}{1+\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}\right)^{-\frac{1}{2}+n}\right.\right.$$

$$\left(\left(9 (B+C) \,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right)\right/ \left(3 \,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\right.\right.$$

$$\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+\left((1-2 n) \,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+\right.$$

$$\left.\left.(5-2 n) \,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)+$$

$$\left(5 (-B+C) \,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] \text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)\right/$$

$$\left(-5 \,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+\right.$$

$$\left((-1+2 n) \,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]+(-5+2 n) \,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\right.\right.$$

$$\frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big) + \frac{1}{3}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{5}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{1}{2}+n}\Big(\Big(9\,(B+C)\,\text{AppellF1}\left[\frac{1}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\left[\frac{1}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$\Big((1-2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$(5-2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{7}{2}-n, -\frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) +$$

$$\Big(5\,(-B+C)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$\Big((-1+2n)\,\text{AppellF1}\left[\frac{5}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$(-5+2n)\,\text{AppellF1}\left[\frac{5}{2}, \frac{7}{2}-n, -\frac{1}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big) -$$

$$\frac{2}{3}\left(-\frac{1}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{5}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{1}{2}+n}$$

$$\Big(\Big(9\,(B+C)\,\text{AppellF1}\left[\frac{1}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\Big/\Big(3\,\text{AppellF1}\Big[\frac{1}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{3}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] + \Big((1-2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$(5-2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{7}{2}-n, -\frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) +$$

$$\Big(5\,(-B+C)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big/$$

$$\Big(-5\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, -\frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$\Big((-1+2n)\,\text{AppellF1}\left[\frac{5}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +$$

$$(-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)+$$

$$\frac{2}{3}\text{Tan}\left[\frac{1}{2}(c+dx)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{5}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\Bigg(\Bigg(9(B+C)\left(-\frac{1}{3}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((-1+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\right.$$

$$\left.-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+\Bigg(5(-B+C)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2$$

$$\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\Bigg((-1+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-\Bigg(9(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\Bigg(\Bigg((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$3\left(-\frac{1}{3}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg((1-2n)\left(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(5-2n)$$

$$\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\Bigg((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(5-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)^2-\Bigg(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg(\Bigg((-1+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-5+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$

$$5\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg((-1+2n)\left(-\frac{5}{7}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{5}{7}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-5+2n)$$

$$\left(-\frac{5}{7}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{5}{7}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((-1+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\right.\right.\right.$$

$$\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]+$$

$$\left.\left.\left.(-5+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\right)\Bigg)$$

- **Problem 231: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+d\,x])^n\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 5, 163 leaves, 5 steps):

$$\frac{2\,B\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-5+2\,n),\frac{1}{4}(-1+2\,n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]}{d\,(5-2\,n)\,\text{Cos}[c+d\,x]^{5/2}\sqrt{\text{Sin}[c+d\,x]^2}}+$$

$$\frac{2\,C\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-3+2\,n),\frac{1}{4}(1+2\,n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]}{d\,(3-2\,n)\,\text{Cos}[c+d\,x]^{3/2}\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 4948 leaves):

$$\Bigg(2\,\text{Cos}[c+d\,x]^{-n}\,(b\,\text{Cos}[c+d\,x])^n$$

$$\left(B\,\text{Cos}[c+d\,x]^{-\frac{3}{2}+n}+\text{Sec}[c+d\,x]^3\left(\frac{1}{2}C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2\,(c+d\,x)]+\frac{1}{2}\,i\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2\,(c+d\,x)]\right)+\right.$$

$$\text{Sec}[c+d\,x]^4\left(-\frac{1}{2}\,i\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2\,(c+d\,x)]\,\text{Sin}[c+d\,x]+B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[c+d\,x]^2+\right.$$

$$\left.\left.\text{Sin}[c+d\,x]\left(-\frac{1}{2}\,i\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2\,(c+d\,x)]\right)\right)\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{7}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{-\frac{3}{2}+n}\left(\left(9\,(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\right/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((3-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,\right.\right.$$

$$\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((-3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.\left.(-7+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,d\left(-\frac{2}{3}\left(-\frac{7}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{9}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{-\frac{3}{2}+n}\right.\right.$$

$$\left(\left(9(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\right.\right.\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((3-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((-3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-7+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\right.\right.$$

$$\left.\left.\left.\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+\frac{1}{3}\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{7}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{-\frac{3}{2}+n}\left(\left(9(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left((3-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.(7-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$
$$\left(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$
$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left((-3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.\left.(-7+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)-$$

$$\frac{2}{3}\left(-\frac{3}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{7}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{1}{2}+n}$$
$$\left(\left(9(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\right.\right.\right.$$
$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]+\left((3-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.(7-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$
$$\left(5(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$
$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left((-3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.\left.(-7+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)+$$

$$\frac{2}{3}\text{Tan}\left[\frac{1}{2}(c+d x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{7}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{3}{2}+n}$$

$$\left(\left(9\,(B+C)\left(-\frac{1}{3}\left(-\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{1}{3}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((3-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(5\,(-B+C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Big/\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((-3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-7+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+\left(5\,(-B+C)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right.$$

$$\left(-\frac{3}{5}\left(-\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Big)\Big/$$

$$\left(-5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((-3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-7+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-\left(9\,(B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right.$$

$$\left(\left((3-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+3\left(-\frac{1}{3}\left(-\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{1}{3}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+\right.$$

$$\text{Tan}[\tfrac{1}{2}(c+d x)]^2 \, \Big((3-2 n) \Big(-\frac{3}{5}\Big(-\frac{1}{2}+n\Big) \text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, \tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2$$

$$\text{Tan}[\tfrac{1}{2}(c+d x)] + \frac{3}{5}\Big(\frac{7}{2}-n\Big) \text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2$$

$$\text{Tan}[\tfrac{1}{2}(c+d x)]\Big) + (7-2 n) \Big(-\frac{3}{5}\Big(-\frac{3}{2}+n\Big) \text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)] + \frac{3}{5}\Big(\frac{9}{2}-n\Big) \text{AppellF1}[\tfrac{5}{2}, \tfrac{11}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)]\Big)\Big)\Big)\Big)\Big) \Big/ \Big(3 \, \text{AppellF1}[\tfrac{1}{2}, \tfrac{7}{2}-n, -\tfrac{3}{2}+n, \tfrac{3}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] +$$

$$\Big((3-2 n) \, \text{AppellF1}[\tfrac{3}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] + (7-2 n) \, \text{AppellF1}[\tfrac{3}{2},$$

$$\tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2]\Big) \, \text{Tan}[\tfrac{1}{2}(c+d x)]^2\Big)^2 -$$

$$\Big(5 (-B+C) \, \text{AppellF1}[\tfrac{3}{2}, \tfrac{7}{2}-n, -\tfrac{3}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Tan}[\tfrac{1}{2}(c+d x)]^2$$

$$\Big(\Big((-3+2 n) \, \text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] +$$

$$(-7+2 n) \, \text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2]\Big) \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)] -$$

$$5 \Big(-\frac{3}{5}\Big(-\frac{3}{2}+n\Big) \text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)] +$$

$$\frac{3}{5}\Big(\frac{7}{2}-n\Big) \text{AppellF1}[\tfrac{5}{2}, \tfrac{9}{2}-n, -\tfrac{3}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)]\Big) +$$

$$\text{Tan}[\tfrac{1}{2}(c+d x)]^2 \, \Big((-3+2 n) \Big(-\frac{5}{7}\Big(-\frac{1}{2}+n\Big) \text{AppellF1}[\tfrac{7}{2}, \tfrac{7}{2}-n, \tfrac{1}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)] + \frac{5}{7}\Big(\frac{7}{2}-n\Big) \text{AppellF1}[\tfrac{7}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)]\Big) + (-7+2 n) \Big(-\frac{5}{7}\Big(-\frac{3}{2}+n\Big) \text{AppellF1}[\tfrac{7}{2}, \tfrac{9}{2}-n, -\tfrac{1}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2,$$

$$-\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)] + \frac{5}{7}\Big(\frac{9}{2}-n\Big) \text{AppellF1}[\tfrac{7}{2}, \tfrac{11}{2}-n, -\tfrac{3}{2}+n, \tfrac{9}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2,$$

$$-\text{Tan}[\tfrac{1}{2}(c+d x)]^2] \, \text{Sec}[\tfrac{1}{2}(c+d x)]^2 \, \text{Tan}[\tfrac{1}{2}(c+d x)]\Big)\Big)\Big)\Big)\Big) \Big/ \Big(-5 \, \text{AppellF1}[\tfrac{3}{2}, \tfrac{7}{2}-n, -\tfrac{3}{2}+n, \tfrac{5}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2,$$

$$-\text{Tan}[\tfrac{1}{2}(c+d x)]^2] + \Big((-3+2 n) \, \text{AppellF1}[\tfrac{5}{2}, \tfrac{7}{2}-n, -\tfrac{1}{2}+n, \tfrac{7}{2}, \text{Tan}[\tfrac{1}{2}(c+d x)]^2, -\text{Tan}[\tfrac{1}{2}(c+d x)]^2] +$$

$$(-7+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)^2\Big)\Big)$$

## Problem 232: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a+a\,\text{Cos}[e+f x])^m\left(B\,\text{Cos}[e+f x]+C\,\text{Cos}[e+f x]^2\right)dx$$

Optimal (type 5, 173 leaves, 4 steps):

$$-\frac{(C-B(2+m))(a+a\,\text{Cos}[e+f x])^m\,\text{Sin}[e+f x]}{f(1+m)(2+m)}+\frac{C(a+a\,\text{Cos}[e+f x])^{1+m}\,\text{Sin}[e+f x]}{a f(2+m)}+\frac{1}{f(1+m)(2+m)}$$
$$2^{\frac{1}{2}+m}\left(B m(2+m)+C\left(1+m+m^2\right)\right)(1+\text{Cos}[e+f x])^{-\frac{1}{2}-m}(a+a\,\text{Cos}[e+f x])^m\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x])\right]\text{Sin}[e+f x]$$

Result (type 5, 356 leaves):

$$\frac{1}{f(-2+m)(-1+m)m(1+m)(2+m)}\,i\,4^{-1-m}e^{-2i(e+f x)}\left(1+e^{i(e+f x)}\right)^{-2m}\left(e^{-\frac{1}{2}i(e+f x)}\left(1+e^{i(e+f x)}\right)\right)^{2m}$$
$$\text{Cos}\left[\frac{1}{2}(e+f x)\right]^{-2m}(a(1+\text{Cos}[e+f x]))^m\left(C m\left(2-m-2m^2+m^3\right)\text{Hypergeometric2F1}\left[-2-m,-2m,-1-m,-e^{i(e+f x)}\right]+\right.$$
$$e^{i(e+f x)}(2+m)\left(2B m\left(2-3m+m^2\right)\text{Hypergeometric2F1}\left[-1-m,-2m,-m,-e^{i(e+f x)}\right]+\right.$$
$$e^{i(e+f x)}(1+m)\left(2B e^{i(e+f x)}(-2+m)m\,\text{Hypergeometric2F1}\left[1-m,-2m,2-m,-e^{i(e+f x)}\right]+C(-1+m)\right.$$
$$\left.\left.\left.\left(e^{2i(e+f x)}m\,\text{Hypergeometric2F1}\left[2-m,-2m,3-m,-e^{i(e+f x)}\right]+2(-2+m)\text{Hypergeometric2F1}\left[-2m,-m,1-m,-e^{i(e+f x)}\right]\right)\right)\right)\right)$$

## Problem 233: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[e+f x])^m\left(B\,\text{Cos}[e+f x]+C\,\text{Cos}[e+f x]^2\right)dx$$

Optimal (type 6, 295 leaves, 8 steps):

$$\frac{C(a+b\,\text{Cos}[e+f x])^{1+m}\,\text{Sin}[e+f x]}{b f(2+m)}-$$
$$\left(\sqrt{2}(a+b)(a C-b B(2+m))\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2},-1-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x]),\frac{b(1-\text{Cos}[e+f x])}{a+b}\right](a+b\,\text{Cos}[e+f x])^m\right.$$
$$\left.\left(\frac{a+b\,\text{Cos}[e+f x]}{a+b}\right)^{-m}\text{Sin}[e+f x]\right)\Big/\left(b^2 f(2+m)\sqrt{1+\text{Cos}[e+f x]}\right)+$$
$$\left(\sqrt{2}\left(a^2 C+b^2 C(1+m)-a b B(2+m)\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2},-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x]),\frac{b(1-\text{Cos}[e+f x])}{a+b}\right]\right.$$
$$\left.(a+b\,\text{Cos}[e+f x])^m\left(\frac{a+b\,\text{Cos}[e+f x]}{a+b}\right)^{-m}\text{Sin}[e+f x]\right)\Big/\left(b^2 f(2+m)\sqrt{1+\text{Cos}[e+f x]}\right)$$

Result (type 6, 13480 leaves):

$$-\Bigg(\Bigg(6\,(a+b)\,\Big(B\,\text{Cos}[e+f\,x]\,(a+b\,\text{Cos}[e+f\,x])^m+C\,\text{Cos}[e+f\,x]^2\,(a+b\,\text{Cos}[e+f\,x])^m\Big)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]\,\left(a+\frac{b-b\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}\right)^m$$

$$\Bigg(\Bigg(B\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)^2\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)-$$

$$\Bigg(C\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)^2\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)-$$

$$\Bigg(2\,B\,\text{AppellF1}\Big[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\ (2+m)\ \text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]\right)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\Bigg)+$$

$$\Bigg(4\,C\ \text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]\ \left(1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\right)\Bigg)\Big/$$

$$\Bigg(3\ (a+b)\ \text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]+$$

$$2\ \Bigg((a-b)\ m\ \text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]-$$

$$(a+b)\ (2+m)\ \text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]\Bigg)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\Bigg)-$$

$$\Bigg(4\,C\ \text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]\Bigg)\Big/$$

$$\Bigg(3\ (a+b)\ \text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]+$$

$$2\ \Bigg((a-b)\ m\ \text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]-$$

$$(a+b)\ (3+m)\ \text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]\Bigg)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(f\ \left(1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\right)^3\ \Bigg(-\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\right)^3}6\ (a+b)\ m\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]\ \Bigg(-\frac{b\ \text{Sec}\left[\frac{1}{2}\ (e+f\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]}{1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}-$$

$$\frac{\text{Sec}\left[\frac{1}{2}\ (e+f\,x)\right]^2\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]\ \left(b-b\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\right)^2}\Bigg)\ \left(a+\frac{b-b\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}\right)^{-1+m}$$

$$\Bigg(\Bigg(B\ \text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2,-\frac{(a-b)\ \text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2}{a+b}\right]\ \left(1+\text{Tan}\left[\frac{1}{2}\ (e+f\,x)\right]^2\right)^2\Bigg)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\right.$$

$$\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\right.$$

$$\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\right.$$

$$\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+2\right.$$

$$\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\right.\right.$$

$$\left.\left.-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.\left.(a+b)\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},\,4+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)+$$

$$\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^4}\,18\,(a+b)\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}\right)^m$$

$$\left(\left(B\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\right)\Big/\right.$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,3+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(3+m)\,\text{AppellF1}\Big[\frac{3}{2},\,4+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)\Bigg)-$$

$$\frac{1}{\left(1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2\right)^3}\,3\,(a+b)\,\text{Sec}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\,\left(a+\frac{b-b\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}\right)^m$$

$$\Bigg(\Bigg(B\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)^2\Bigg)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)-$$

$$\Bigg(C\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)^2\Bigg)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)-$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\,\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\,\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\,\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(3+m)\,\text{AppellF1}\left[\frac{3}{2},\,4+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)-$$

$$\frac{1}{\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^3} 6(a+b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\left(a+\frac{b-b\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m$$

$$\Bigg(\Bigg(2\,B\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]$$

$$\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\Bigg)\Bigg/\Bigg(3(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-$$

$$(a+b)(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)-$$

$$\Bigg(2\,C\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]$$

$$\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\Bigg)\Bigg/\Bigg(3(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-$$

$$(a+b)(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\Bigg(B\Bigg(1/(3(a+b))(a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/\Bigg(3(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]+2\left((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.(a+b)\,(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\Big)-$$

$$\left(C\left(1/(3\,(a+b))\,(a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]-\frac{1}{3}(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]$$

$$\left.\left.\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2\right)\Big/\left(3\,(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\right.\right.$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]+2\left((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.(a+b)\,(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\Big)-$$

$$\left(2\,B\,\mathrm{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\Big/$$

$$\left(3\,(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\mathrm{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)+$$

$$\left(4\,C\,\mathrm{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(2\,B\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(4\,C\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(4\,C\left(1/(3(a+b))(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\Big/\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(B\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right.$$

$$\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3(a+b)\left(\frac{1}{3(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((a-b)\,m\left(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\text{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]\Bigg)-(a+b)\,(1+m)\,\Bigg(\frac{1}{5\,(a+b)}3\,(a-b)\,m\,\mathrm{AppellF1}\Big[\frac{5}{2},$$

$$2+m,\,1-m,\,\frac{7}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]-\frac{3}{5}(2+m)$$

$$\mathrm{AppellF1}\Big[\frac{5}{2},\,3+m,\,-m,\,\frac{7}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\mathrm{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]-$$

$$(a+b)\,(1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\Bigg)^2+$$

$$\Bigg(C\,\mathrm{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\,\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2\right)^2$$

$$\Bigg(2\,\Bigg((a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]-(a+b)\,(1+m)$$

$$\mathrm{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\Bigg)\,\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]+$$

$$3\,(a+b)\,\Bigg(\frac{1}{3\,(a+b)}(a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]-\frac{1}{3}(1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]\Bigg)+2\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2$$

$$\Bigg((a-b)\,m\,\Bigg(-\frac{1}{5\,(a+b)}3\,(a-b)\,(1-m)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,1+m,\,2-m,\,\frac{7}{2},\,-\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2,\,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f\,x)\right]^2}{a+b}\Big]$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)-(a+b)(1+m)\left(\frac{1}{5(a+b)}3(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(2+m)$$

$$\left.\left.\text{AppellF1}\left[\frac{5}{2},3+m,-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\Bigg/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.(a+b)(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2+$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)$$

$$\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(2+m)\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3(a+b)\left(\frac{1}{3(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((a-b)\,m\left(-\frac{1}{5\,(a+b)}3\,(a-b)\,(1-m)\,\text{AppellF1}\left[\frac{5}{2},\,2+m,\,2-m,\,\frac{7}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{3}{5}\,(2+m)\,\text{AppellF1}\left[\frac{5}{2},\,3+m,\,1-m,\,\frac{7}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)-(a+b)\,(2+m)\,\left(\frac{1}{5\,(a+b)}3\,(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$3+m,\,1-m,\,\frac{7}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\Bigg]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{3}{5}\,(3+m)$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2},\,4+m,\,-m,\,\frac{7}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\right)\right)\right)\Bigg/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right.$$

$$\left(2\,\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]+$$

$$3\,(a+b)\,\left(\frac{1}{3\,(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]\ \text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)])+2\,\text{Tan}[\frac{1}{2}(e+f x)]^2$$

$$((a-b)\,m\,(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\text{AppellF1}[\frac{5}{2},2+m,2-m,\frac{7}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]$$

$$\text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)]-\frac{3}{5}(2+m)\,\text{AppellF1}[\frac{5}{2},3+m,1-m,\frac{7}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,$$

$$-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]\ \text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)])-(a+b)(2+m)\,(\frac{1}{5(a+b)}3(a-b)\,m\,\text{AppellF1}[\frac{5}{2},$$

$$3+m,1-m,\frac{7}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]\ \text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)]-\frac{3}{5}(3+m)$$

$$\text{AppellF1}[\frac{5}{2},4+m,-m,\frac{7}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]\ \text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)]))))\Big/$$

$$(3(a+b)\,\text{AppellF1}[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]+$$

$$2\,((a-b)\,m\,\text{AppellF1}[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]-$$

$$(a+b)(2+m)\,\text{AppellF1}[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}])\ \text{Tan}[\frac{1}{2}(e+f x)]^2)^2+$$

$$(4\,C\,\text{AppellF1}[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]\ (2\,((a-b)\,m\,\text{AppellF1}[\frac{3}{2},3+m,1-m,$$

$$\frac{5}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]-(a+b)(3+m)\,\text{AppellF1}[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,$$

$$-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}])\ \text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)]+3(a+b)\,(\frac{1}{3(a+b)}(a-b)\,m\,\text{AppellF1}[\frac{3}{2},3+m,1-m,$$

$$\frac{5}{2},-\text{Tan}[\frac{1}{2}(e+f x)]^2,-\frac{(a-b)\,\text{Tan}[\frac{1}{2}(e+f x)]^2}{a+b}]\ \text{Sec}[\frac{1}{2}(e+f x)]^2\,\text{Tan}[\frac{1}{2}(e+f x)]-\frac{1}{3}(3+m)\,\text{AppellF1}[\frac{3}{2},4+m,$$

$$-m,\ \frac{5}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\Big]\ \mathrm{Sec}\left[\frac{1}{2}(e+fx)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)+2\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2$$

$$\Bigg((a-b)\,m\,\Bigg(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\mathrm{AppellF1}\left[\frac{5}{2},\ 3+m,\ 2-m,\ \frac{7}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+fx)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]-\frac{3}{5}(3+m)\,\mathrm{AppellF1}\Big[\frac{5}{2},\ 4+m,\ 1-m,\ \frac{7}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\Big]\ \mathrm{Sec}\left[\frac{1}{2}(e+fx)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)-(a+b)(3+m)\ \Bigg(\frac{1}{5(a+b)}3(a-b)\,m\,\mathrm{AppellF1}\Big[\frac{5}{2},$$

$$4+m,\ 1-m,\ \frac{7}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\Big]\ \mathrm{Sec}\left[\frac{1}{2}(e+fx)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]-\frac{3}{5}(4+m)$$

$$\mathrm{AppellF1}\left[\frac{5}{2},\ 5+m,\ -m,\ \frac{7}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+fx)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},\ 3+m,\ -m,\ \frac{3}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+$$

$$2\,\Bigg((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},\ 3+m,\ 1-m,\ \frac{5}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-$$

$$(a+b)(3+m)\,\mathrm{AppellF1}\left[\frac{3}{2},\ 4+m,\ -m,\ \frac{5}{2},\ -\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\ -\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\Bigg)\ \mathrm{Tan}\left[\frac{1}{2}(e+fx)\right]^2\Bigg)^2\Bigg)\Bigg)\Bigg)\Bigg)$$

## Problem 238: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a\,\mathrm{Cos}[e+fx])^m\left(A+B\,\mathrm{Cos}[e+fx]+C\,\mathrm{Cos}[e+fx]^2\right)dx$$

Optimal (type 5, 187 leaves, 4 steps):

$$\frac{C\,(a\,\mathrm{Cos}[e+fx])^{1+m}\,\mathrm{Sin}[e+fx]}{a\,f\,(2+m)}-\frac{(C(1+m)+A(2+m))\,(a\,\mathrm{Cos}[e+fx])^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\mathrm{Cos}[e+fx]^2\right]\mathrm{Sin}[e+fx]}{a\,f\,(1+m)(2+m)\sqrt{\mathrm{Sin}[e+fx]^2}}-$$

$$\frac{B\,(a\,\mathrm{Cos}[e+fx])^{2+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\mathrm{Cos}[e+fx]^2\right]\mathrm{Sin}[e+fx]}{a^2\,f\,(2+m)\sqrt{\mathrm{Sin}[e+fx]^2}}$$

Result (type 5, 441 leaves):

$$\frac{1}{4f}C\,\mathrm{Cos}[e+fx]^{-m}\,(a\,\mathrm{Cos}[e+fx])^m$$

$$\left(1/(2+m)\,i\,2^{-m}\,e^{-2i(e+fx)}\left(e^{-i(e+fx)}+e^{i(e+fx)}\right)^m\left(1+e^{2i(e+fx)}\right)^{-m}\mathrm{Hypergeometric2F1}\left[-1-\frac{m}{2},-m,-\frac{m}{2},-e^{2i(e+fx)}\right]+\right.$$

$$\left.1/(-2+m)\,i\,2^{-m}\,e^{2i(e+fx)}\left(e^{-i(e+fx)}+e^{i(e+fx)}\right)^m\left(1+e^{2i(e+fx)}\right)^{-m}\mathrm{Hypergeometric2F1}\left[1-\frac{m}{2},-m,2-\frac{m}{2},-e^{2i(e+fx)}\right]\right)-$$

$$\frac{A\,\mathrm{Cos}[e+fx]\,(a\,\mathrm{Cos}[e+fx])^m\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\mathrm{Cos}[e+fx]^2\right]\mathrm{Sin}[e+fx]}{f\,(1+m)\,\sqrt{\mathrm{Sin}[e+fx]^2}}-$$

$$\frac{C\,\mathrm{Cos}[e+fx]\,(a\,\mathrm{Cos}[e+fx])^m\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\mathrm{Cos}[e+fx]^2\right]\mathrm{Sin}[e+fx]}{2f\,(1+m)\,\sqrt{\mathrm{Sin}[e+fx]^2}}-$$

$$\frac{B\,\mathrm{Cos}[e+fx]^2\,(a\,\mathrm{Cos}[e+fx])^m\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\mathrm{Cos}[e+fx]^2\right]\mathrm{Sin}[e+fx]}{f\,(2+m)\,\sqrt{\mathrm{Sin}[e+fx]^2}}$$

- **Problem 267: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]}{\sqrt{b\,\mathrm{Cos}[c+dx]}}\,dx$$

Optimal (type 4, 110 leaves, 7 steps):

$$-\frac{2\,(A-C)\,\sqrt{b\,\mathrm{Cos}[c+dx]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+dx),2\right]}{b\,d\,\sqrt{\mathrm{Cos}[c+dx]}}+\frac{2\,B\,\sqrt{\mathrm{Cos}[c+dx]}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+dx),2\right]}{d\,\sqrt{b\,\mathrm{Cos}[c+dx]}}+\frac{2\,A\,\mathrm{Sin}[c+dx]}{d\,\sqrt{b\,\mathrm{Cos}[c+dx]}}$$

Result (type 5, 803 leaves):

$$\frac{\mathrm{Cos}[c+dx]^2\,(B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\left(-\frac{2\,(-2A+C+C\,\mathrm{Cos}[2c])\,\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{d}+\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+dx]\,\mathrm{Sin}[dx]}{d}\right)}{\sqrt{b\,\mathrm{Cos}[c+dx]}\;(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])}-$$

$$\left(4\,B\,\mathrm{Cos}[c+dx]^{3/2}\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[dx-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\right.$$

$$(B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\,\mathrm{Sec}[dx-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[dx-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\;\mathrm{Sin}[c]\,\mathrm{Sin}[dx-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\;\sqrt{1+\mathrm{Sin}[dx-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/$$

$$\left(d\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\sqrt{1+\text{Cot}[c]^2}\right)+\Bigg(2\,A\,\text{Cos}[c+d\,x]^{3/2}\,\text{Csc}[c]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\Bigg)\Bigg)\Big/$$

$$\left(d\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)-\Bigg(2\,C\,\text{Cos}[c+d\,x]^{3/2}\,\text{Csc}[c]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\Bigg)\Bigg)\Big/\left(d\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 268: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2}{\sqrt{b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 139 leaves, 8 steps) :

$$-\frac{2\,B\,\sqrt{b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,(A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d\,\sqrt{b\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,b\,\text{Sin}[c+d\,x]}{3\,d\,(b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\,B\,\text{Sin}[c+d\,x]}{d\,\sqrt{b\,\text{Cos}[c+d\,x]}}$$

Result (type 5, 757 leaves) :

$$\left(\text{Cos}[c+d\,x]^3\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$
$$\left.\left(\frac{4\,B\,\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{4\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}+\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+3\,B\,\text{Sin}[d\,x])}{3\,d}\right)\right)\Big/$$
$$\left(\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)-$$
$$\left(4\,A\,\text{Cos}[c+d\,x]^{5/2}\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(4\,C\,\text{Cos}[c+d\,x]^{5/2}\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$
$$\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(d\,\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+\left(2\,B\,\text{Cos}[c+d\,x]^{5/2}\,\text{Csc}[c]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)\Big/\left(d\sqrt{b\,\text{Cos}[c+d x]}\,(2 A+C+2 B\,\text{Cos}[c+d x]+C\,\text{Cos}[2 c+2 d x])\right)$$

- **Problem 276: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]}{(b\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 144 leaves, 8 steps):

$$-\frac{2 B\sqrt{b\,\text{Cos}[c+d x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{b^2 d\sqrt{\text{Cos}[c+d x]}}+$$

$$\frac{2(A+3 C)\sqrt{\text{Cos}[c+d x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 b d\sqrt{b\,\text{Cos}[c+d x]}}+\frac{2 A\,\text{Sin}[c+d x]}{3 d\,(b\,\text{Cos}[c+d x])^{3/2}}+\frac{2 B\,\text{Sin}[c+d x]}{b d\sqrt{b\,\text{Cos}[c+d x]}}$$

Result (type 5, 761 leaves):

$$\frac{1}{b}\left(\left(\text{Cos}[c+d x]^3\left(C+B\,\text{Sec}[c+d x]+A\,\text{Sec}[c+d x]^2\right)\right.\right.$$

$$\left.\left.\left(\frac{4 B\,\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{4 A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{3 d}+\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d x]\,(A\,\text{Sin}[c]+3 B\,\text{Sin}[d x])}{3 d}\right)\right)\Big/\right.$$

$$\left(\sqrt{b\,\text{Cos}[c+d x]}\,(2 A+C+2 B\,\text{Cos}[c+d x]+C\,\text{Cos}[2 c+2 d x])\right)-$$

$$\left(4 A\,\text{Cos}[c+d x]^{5/2}\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\left(C+B\,\text{Sec}[c+d x]+A\,\text{Sec}[c+d x]^2\right)\right.$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(4\,C\,\text{Cos}[c+d\,x]^{5/2}\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(2\,B\,\text{Cos}[c+d\,x]^{5/2}\,\text{Csc}[c]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)\Big/\left(d\,\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 283: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 116 leaves, 7 steps):

$$-\frac{2\,(A-C)\,\sqrt{b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{b^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,B\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{b^2\,d\,\sqrt{b\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sin}[c+d\,x]}{b^2\,d\,\sqrt{b\,\text{Cos}[c+d\,x]}}$$

Result (type 5, 807 leaves):

$$\frac{1}{b^2}\left(\frac{\text{Cos}[c+d\,x]^2\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\left(-\frac{2\,(-2\,A+C+C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{4\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}\right)}{\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])}-\right.$$

$$\left(4\,B\,\text{Cos}[c+d\,x]^{3/2}\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,\sqrt{b\,\text{Cos}[c+d\,x]}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(2\,A\,\text{Cos}[c+d\,x]^{3/2}\,\text{Csc}[c]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)\Big/$$

$$\left(d\sqrt{b\,\text{Cos}[c+d\,x]}\ (2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)-\Bigg(2\,C\,\text{Cos}[c+d\,x]^{3/2}\,\text{Csc}[c]\ (B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)\Bigg/\left(d\sqrt{b\,\text{Cos}[c+d\,x]}\ (2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)\Bigg)$$

- **Problem 296: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{b\,\text{Cos}[c+d\,x]}\ \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 3, 193 leaves, 7 steps):

$$\frac{(3\,A+4\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]\,\sqrt{b\,\text{Cos}[c+d\,x]}}{8\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{A\,\sqrt{b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\text{Cos}[c+d\,x]^{9/2}}+$$

$$\frac{(3\,A+4\,C)\,\sqrt{b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{8\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{B\,\sqrt{b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{B\,\sqrt{b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]^3}{3\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 3, 609 leaves):

$$\frac{(-3A-4C)\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{(3A+4C)\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d\sqrt{\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{A\sqrt{b\,\mathrm{Cos}[c+d\,x]}}{16\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{(9A+4B+12C)\sqrt{b\,\mathrm{Cos}[c+d\,x]}}{48\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$

$$\frac{B\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{6\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{2B\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{3\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}-$$

$$\frac{A\sqrt{b\,\mathrm{Cos}[c+d\,x]}}{16\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{B\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{6\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+$$

$$\frac{(-9A-4B-12C)\sqrt{b\,\mathrm{Cos}[c+d\,x]}}{48\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{2B\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{3\,d\sqrt{\mathrm{Cos}[c+d\,x]}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}$$

- **Problem 305: Result more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 3, 198 leaves, 7 steps):

$$\frac{b\,(3A+4C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]\sqrt{b\,\mathrm{Cos}[c+d\,x]}}{8\,d\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{A\,b\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{4\,d\,\mathrm{Cos}[c+d\,x]^{9/2}}+$$

$$\frac{b\,(3A+4C)\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{8\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{b\,B\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{b\,B\sqrt{b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]^3}{3\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}$$

Result (type 3, 609 leaves):

$$\frac{(-3A-4C)\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{(3A+4C)\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+$$

$$\frac{A\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}}{16\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{(9A+4B+12C)\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}}{48\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$

$$\frac{B\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{6\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{2\,B\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}-$$

$$\frac{A\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}}{16\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{B\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{6\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+$$

$$\frac{(-9A-4B-12C)\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}}{48\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{2\,B\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}$$

- **Problem 314: Result more than twice size of optimal antiderivative.**

$$\int \frac{(b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{15/2}}\,dx$$

Optimal (type 3, 208 leaves, 7 steps) :

$$\frac{b^2\,(3A+4C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}{8\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{A\,b^2\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\mathrm{Cos}[c+d\,x]^{9/2}}+$$

$$\frac{b^2\,(3A+4C)\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{8\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{b^2\,B\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{b^2\,B\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]^3}{3\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}$$

Result (type 3, 609 leaves) :

$$\frac{(-3A-4C)\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{(3A+4C)\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+$$

$$\frac{A\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}}{16\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{(9A+4B+12C)\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}}{48\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$

$$\frac{B\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{6\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{2B\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{3\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}-$$

$$\frac{A\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}}{16\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{B\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{6\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+$$

$$\frac{(-9A-4B-12C)\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}}{48\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{2B\,(b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{3\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}$$

- **Problem 322: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{9/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 193 leaves, 7 steps):

$$\frac{(3A+4C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]\,\sqrt{\mathrm{Cos}[c+d\,x]}}{8\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\mathrm{Sin}[c+d\,x]}{4\,d\,\mathrm{Cos}[c+d\,x]^{7/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{(3A+4C)\,\mathrm{Sin}[c+d\,x]}{8\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{B\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{B\,\mathrm{Sin}[c+d\,x]^3}{3\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 609 leaves):

$$\frac{(-3\,A-4\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{(3\,A+4\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{A\,\sqrt{\mathrm{Cos}[c+d\,x]}}{16\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{(9\,A+4\,B+12\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}}{48\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{B\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{2\,B\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}-$$

$$\frac{A\,\sqrt{\mathrm{Cos}[c+d\,x]}}{16\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{B\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(-9\,A-4\,B-12\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}}{48\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{2\,B\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

- **Problem 330: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{7/2}\,(b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 208 leaves, 7 steps):

$$\frac{(3\,A+4\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]\,\sqrt{\mathrm{Cos}[c+d\,x]}}{8\,b\,d\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\mathrm{Sin}[c+d\,x]}{4\,b\,d\,\mathrm{Cos}[c+d\,x]^{7/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{(3\,A+4\,C)\,\mathrm{Sin}[c+d\,x]}{8\,b\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{B\,\mathrm{Sin}[c+d\,x]}{b\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}+\frac{B\,\mathrm{Sin}[c+d\,x]^3}{3\,b\,d\,\mathrm{Cos}[c+d\,x]^{5/2}\,\sqrt{b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 609 leaves):

$$\frac{(-3 A-4 C) \operatorname{Cos}[c+d x]^{3/2} \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d (b \operatorname{Cos}[c+d x])^{3/2}}+\frac{(3 A+4 C) \operatorname{Cos}[c+d x]^{3/2} \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d (b \operatorname{Cos}[c+d x])^{3/2}}+$$

$$\frac{A \operatorname{Cos}[c+d x]^{3/2}}{16 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{(9 A+4 B+12 C) \operatorname{Cos}[c+d x]^{3/2}}{48 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$

$$\frac{B \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{6 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+\frac{2 B \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{3 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}-$$

$$\frac{A \operatorname{Cos}[c+d x]^{3/2}}{16 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{B \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{6 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+$$

$$\frac{(-9 A-4 B-12 C) \operatorname{Cos}[c+d x]^{3/2}}{48 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{2 B \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{3 d (b \operatorname{Cos}[c+d x])^{3/2}\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}$$

- **Problem 338: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2}{\operatorname{Cos}[c+d x]^{5/2} (b \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 208 leaves, 7 steps):

$$\frac{(3 A+4 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]] \sqrt{\operatorname{Cos}[c+d x]}}{8 b^2 d \sqrt{b \operatorname{Cos}[c+d x]}}+\frac{A \operatorname{Sin}[c+d x]}{4 b^2 d \operatorname{Cos}[c+d x]^{7/2} \sqrt{b \operatorname{Cos}[c+d x]}}+$$

$$\frac{(3 A+4 C) \operatorname{Sin}[c+d x]}{8 b^2 d \operatorname{Cos}[c+d x]^{3/2} \sqrt{b \operatorname{Cos}[c+d x]}}+\frac{B \operatorname{Sin}[c+d x]}{b^2 d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{b \operatorname{Cos}[c+d x]}}+\frac{B \operatorname{Sin}[c+d x]^3}{3 b^2 d \operatorname{Cos}[c+d x]^{5/2} \sqrt{b \operatorname{Cos}[c+d x]}}$$

Result (type 3, 609 leaves):

$$\frac{(-3A-4C)\,\text{Cos}[c+d x]^{5/2}\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d\,(b\,\text{Cos}[c+d x])^{5/2}}+\frac{(3A+4C)\,\text{Cos}[c+d x]^{5/2}\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d\,(b\,\text{Cos}[c+d x])^{5/2}}+$$
$$\frac{A\,\text{Cos}[c+d x]^{5/2}}{16 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{(9A+4B+12C)\,\text{Cos}[c+d x]^{5/2}}{48 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$
$$\frac{B\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{6 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+\frac{2B\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{3 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}-$$
$$\frac{A\,\text{Cos}[c+d x]^{5/2}}{16 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{B\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{6 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+$$
$$\frac{(-9A-4B-12C)\,\text{Cos}[c+d x]^{5/2}}{48 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{2B\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{3 d\,(b\,\text{Cos}[c+d x])^{5/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}$$

- **Problem 354: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]}{(b\,\text{Cos}[c+d x])^{1/3}}\,dx$$

Optimal (type 5, 149 leaves, 5 steps):

$$\frac{3A\,\text{Sin}[c+d x]}{d\,(b\,\text{Cos}[c+d x])^{1/3}}-\frac{3B\,(b\,\text{Cos}[c+d x])^{2/3}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{1}{2},\frac{4}{3},\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{2 b d\sqrt{\text{Sin}[c+d x]^2}}+$$
$$\frac{3(2A-C)\,(b\,\text{Cos}[c+d x])^{5/3}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{5}{6},\frac{11}{6},\text{Cos}[c+d x]^2\right]\text{Sin}[c+d x]}{5 b^2 d\sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 5, 779 leaves):

$$\frac{\text{Cos}[c+d x]^2\,(B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\left(-\frac{3(-4A+C+C\,\text{Cos}[2c])\,\text{Csc}[c]\,\text{Sec}[c]}{2d}+\frac{6A\,\text{Sec}[c]\,\text{Sec}[c+d x]\,\text{Sin}[d x]}{d}\right)}{(b\,\text{Cos}[c+d x])^{1/3}\,(2A+C+2B\,\text{Cos}[c+d x]+C\,\text{Cos}[2c+2d x])}-$$
$$\Bigg(2B\,\text{Cos}[c+d x]^{4/3}\,\text{Cos}[d x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2}{3},\frac{3}{2},\text{Cos}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right](B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]\Bigg)\Big/$$
$$\left(d\,(b\,\text{Cos}[c+d x])^{1/3}\,(2A+C+2B\,\text{Cos}[c+d x]+C\,\text{Cos}[2c+2d x])\,(\text{Cos}[c]\,\text{Cos}[d x]-\text{Sin}[c]\,\text{Sin}[d x])^{1/3}\left(\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right)^{1/3}\right)+$$

$$\Bigg(4\,A\,\text{Cos}[c+d\,x]^{4/3}\,\text{Csc}[c]\,\left(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x]\right)$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{6}\right\},\left\{\frac{5}{6}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\left(\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{3\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{2\left(\text{Cos}[c]^2+\text{Sin}[c]^2\right)}}{\left(\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}}\Bigg)\Bigg)\Big/$$

$$\left(d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)-\Bigg(2\,C\,\text{Cos}[c+d\,x]^{4/3}\,\text{Csc}[c]\,\left(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x]\right)$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{6}\right\},\left\{\frac{5}{6}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\left(\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{3\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{2\left(\text{Cos}[c]^2+\text{Sin}[c]^2\right)}}{\left(\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}}\Bigg)\Bigg)\Big/\left(d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 355: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2}{(b\,\text{Cos}[c+d\,x])^{1/3}}\,dx$$

Optimal (type 5, 145 leaves, 5 steps):

$$\frac{3\,A\,b\,\text{Sin}[c+d\,x]}{4\,d\,(b\,\text{Cos}[c+d\,x])^{4/3}}+\frac{3\,B\,\text{Hypergeometric2F1}\left[-\frac{1}{6},\,\frac{1}{2},\,\frac{5}{6},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}-$$
$$\frac{3\,(A+4\,C)\,(b\,\text{Cos}[c+d\,x])^{2/3}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\,\frac{1}{2},\,\frac{4}{3},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{8\,b\,d\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 699 leaves) :

$$\left(\text{Cos}[c+d x]^3 \left(C+B\,\text{Sec}[c+d x]+A\,\text{Sec}[c+d x]^2\right) \left(\frac{6\,B\,\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{3\,A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{2\,d}+\frac{3\,\text{Sec}[c]\,\text{Sec}[c+d x]\,(A\,\text{Sin}[c]+4\,B\,\text{Sin}[d x])}{2\,d}\right)\right) \Big/$$

$$\left((b\,\text{Cos}[c+d x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\right) - \left(A\,\text{Cos}[c+d x]^{7/3}\,\text{Cos}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2}{3},\frac{3}{2},\text{Cos}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \left(C+B\,\text{Sec}[c+d x]+A\,\text{Sec}[c+d x]^2\right)\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]\right) \Big/$$

$$\left(2\,d\,(b\,\text{Cos}[c+d x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\,(\text{Cos}[c]\,\text{Cos}[d x]-\text{Sin}[c]\,\text{Sin}[d x])^{1/3}\left(\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right)^{1/3}\right) -$$

$$\left(2\,C\,\text{Cos}[c+d x]^{7/3}\,\text{Cos}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2}{3},\frac{3}{2},\text{Cos}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$

$$\left.\left(C+B\,\text{Sec}[c+d x]+A\,\text{Sec}[c+d x]^2\right)\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]\right) \Big/$$

$$\left(d\,(b\,\text{Cos}[c+d x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\,(\text{Cos}[c]\,\text{Cos}[d x]-\text{Sin}[c]\,\text{Sin}[d x])^{1/3}\left(\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right)^{1/3}\right) +$$

$$\left(4\,B\,\text{Cos}[c+d x]^{7/3}\,\text{Csc}[c]\left(C+B\,\text{Sec}[c+d x]+A\,\text{Sec}[c+d x]^2\right)\right.$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{6}\right\},\left\{\frac{5}{6}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right) \Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\left(\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}\sqrt{1+\text{Tan}[c]^2}\right) -$$

$$\left.\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{3\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{2\left(\text{Cos}[c]^2+\text{Sin}[c]^2\right)}}{\left(\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}}\right)\right) \Big/ \left(d\,(b\,\text{Cos}[c+d x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\right)$$

- **Problem 361: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]}{(b\,\text{Cos}[c+d x])^{4/3}}\,dx$$

Optimal (type 5, 147 leaves, 5 steps):

$$\frac{3\,A\,\text{Sin}[c+d\,x]}{4\,d\,(b\,\text{Cos}[c+d\,x])^{4/3}}+\frac{3\,B\,\text{Hypergeometric2F1}\left[-\frac{1}{6},\,\frac{1}{2},\,\frac{5}{6},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{b\,d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}-\frac{3\,(A+4\,C)\,(b\,\text{Cos}[c+d\,x])^{2/3}\,\text{Hypergeometric2F1}\left[\frac{1}{3},\,\frac{1}{2},\,\frac{4}{3},\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{8\,b^2\,d\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 5, 703 leaves) :

$$\frac{1}{b}\left(\left(\text{Cos}[c+d\,x]^3\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\left(\frac{6\,B\,\text{Csc}[c]\,\text{Sec}[c]}{d}+\frac{3\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{2\,d}+\frac{3\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+4\,B\,\text{Sin}[d\,x])}{2\,d}\right)\right)\Big/\right.$$
$$\left((b\,\text{Cos}[c+d\,x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)-$$
$$\left(A\,\text{Cos}[c+d\,x]^{7/3}\,\text{Cos}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{2}{3},\,\frac{3}{2},\,\text{Cos}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$
$$\left.\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right)\Big/\,\left(2\,d\,(b\,\text{Cos}[c+d\,x])^{1/3}\right.$$
$$\left.(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,(\text{Cos}[c]\,\text{Cos}[d\,x]-\text{Sin}[c]\,\text{Sin}[d\,x])^{1/3}\,\left(\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right)^{1/3}\right)-$$
$$\left(2\,C\,\text{Cos}[c+d\,x]^{7/3}\,\text{Cos}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{2}{3},\,\frac{3}{2},\,\text{Cos}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$
$$\left.\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right)\Big/$$
$$\left(d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,(\text{Cos}[c]\,\text{Cos}[d\,x]-\text{Sin}[c]\,\text{Sin}[d\,x])^{1/3}\,\left(\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right)^{1/3}\right)+$$
$$\left(4\,B\,\text{Cos}[c+d\,x]^{7/3}\,\text{Csc}[c]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},\,-\frac{1}{6}\right\},\,\left\{\frac{5}{6}\right\},\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\left(\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}\right.$$

$$\left.\left.\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{3\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{2\left(\text{Cos}[c]^2+\text{Sin}[c]^2\right)}}{\left(\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}\right)^{1/3}}\right)\right)\Big/$$

$$\left.\left(d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)\right)$$

**Problem 366: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(b\,\text{Cos}[c+d\,x])^{1/3}}\,dx$$

Optimal (type 5, 229 leaves, 5 steps):

$$\frac{3\,C\,\text{Cos}[c+d\,x]^{1+m}\,\text{Sin}[c+d\,x]}{d\,(5+3\,m)\,(b\,\text{Cos}[c+d\,x])^{1/3}}-$$
$$\left(3\,(C\,(2+3\,m)+A\,(5+3\,m))\,\text{Cos}[c+d\,x]^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{6}\,(2+3\,m),\,\frac{1}{6}\,(8+3\,m),\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(d\,(2+3\,m)\,(5+3\,m)\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\frac{3\,B\,\text{Cos}[c+d\,x]^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{6}\,(5+3\,m),\,\frac{1}{6}\,(11+3\,m),\,\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{d\,(5+3\,m)\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 7630 leaves):

$$\left(2\,\text{Cos}[c+d\,x]^{1/3}\left(\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[2\,(c+d\,x)]-\right.\right.$$
$$\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[2\,(c+d\,x)]+\text{Sec}[c+d\,x]\left(\left(A\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\right)\text{Cos}[2\,(c+d\,x)]^2-\right.$$
$$\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[3\,(c+d\,x)]\,\text{Sin}[2\,(c+d\,x)]-\frac{1}{4}\,i\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[4\,(c+d\,x)]\,\text{Sin}[2\,(c+d\,x)]+$$
$$\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[c+d\,x]\,\text{Sin}[2\,(c+d\,x)]+\left(A\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\right)\text{Sin}[2\,(c+d\,x)]^2+$$
$$\text{Cos}[2\,(c+d\,x)]\left(\frac{1}{4}\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Cos}[4\,(c+d\,x)]+\right.$$

$$\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[c+d\,x]+\frac{1}{2}\,i\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,i\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[4\,(c+d\,x)]\Bigg)+$$

$$\text{Sin}[2\,(c+d\,x)]\,\left(-\frac{1}{4}\,i\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\text{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\text{Sin}[4\,(c+d\,x)]\right)\Bigg)\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}\,\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{\frac{8}{3}+m}$$

$$\Bigg(\Bigg(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\Bigg/$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+2\,\Bigg(-(8+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(1-3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Bigg/$$

$$\Bigg(15\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$2\,\Bigg(-(8+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$(1-3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)-$$

$$\Bigg(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\Bigg(-21\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$2\,\Bigg((8+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{9}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$(-1+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{9}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(5\,d\,(b\,\text{Cos}[c+d\,x])^{1/3}\,\Bigg(-\frac{2}{5}\,\left(-\frac{1}{3}+m\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\left(1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{4}{3}+m}\,\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{\frac{8}{3}+m}$$

$$\Bigg(\Bigg(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\Bigg/\,\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{3}{2},\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] + 2 \Big(-(8+3 m)\,\text{AppellF1}[\frac{3}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$(1-3 m)\,\text{AppellF1}[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) +$$

$$\Big(50 (A-C)\,\text{AppellF1}[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) \Big/ \Big(15\,\text{AppellF1}[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,$$

$$\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] + 2 \Big(-(8+3 m)\,\text{AppellF1}[\frac{5}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$(1-3 m)\,\text{AppellF1}[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) -$$

$$\Big(21 (A-B+C)\,\text{AppellF1}[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4\Big) \Big/$$

$$\Big(-21\,\text{AppellF1}[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$2 \Big((8+3 m)\,\text{AppellF1}[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] + (-1+3 m)\,\text{AppellF1}[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,$$

$$\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big) + \frac{1}{5}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{1}{3}+m}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{8}{3}+m} \Big(\Big(45 (A+B+C)\,\text{AppellF1}[\frac{1}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\Big) \Big/$$

$$\Big(9\,\text{AppellF1}[\frac{1}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$2 \Big(-(8+3 m)\,\text{AppellF1}[\frac{3}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$(1-3 m)\,\text{AppellF1}[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) +$$

$$\Big(50 (A-C)\,\text{AppellF1}[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) \Big/$$

$$\Big(15\,\text{AppellF1}[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$2 \Big(-(8+3 m)\,\text{AppellF1}[\frac{5}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2] +$$

$$(1-3 m)\,\text{AppellF1}[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2]\Big)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) -$$

$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$2\left((8+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)-$$

$$\frac{2}{5}\left(\frac{8}{3}+m\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{11}{3}+m}$$

$$\left(\left(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\right.$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$2\left(-(8+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$2\left(-(8+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-$$

$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$2\left((8+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{2}{5}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{1}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{\frac{8}{3}+m}$$

$$\left(\left(45\,(A+B+C)\,\left(-\frac{1}{3}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.\right.\right.$$

$$\left.\left.\frac{1}{3}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$2\left(-(8+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-3\,m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$2\left(-(8+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(-\frac{3}{5}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{3}{5}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(15\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$2\left(-(8+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{11}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-3\,m)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)-$$

$$\left(42\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3\right)\Big/$$

$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\,\frac{1}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$2\left((8+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-1+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-\Bigg(21(A-B+C)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4$$

$$\Bigg(-\frac{5}{7}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$\frac{5}{7}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+2\Bigg((8+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\frac{11}{3}+m,\right.$$

$$\left.\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-1+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-\Bigg(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\Bigg(2\Bigg(-(8+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(1-3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$9\Bigg(-\frac{1}{3}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$\frac{1}{3}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg(-(8+3m)\Bigg(-\frac{3}{5}\left(\frac{11}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{14}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{11}{3}+m,\frac{7}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)+(1-3m)$$

$$\Bigg(-\frac{3}{5}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{11}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$\frac{3}{5}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+2\Bigg(-(8+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{3}-m,\frac{11}{3}+m,\frac{5}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(1-3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)$$

$$\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2)^2-(50\,(A-C)\,\text{AppellF1}[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{5}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]$$

$$\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2\,(2\,(-(8+3\,m)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{11}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]+$$

$$(1-3\,m)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2])\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]+$$

$$15\,(-\tfrac{3}{5}(\tfrac{8}{3}+m)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{11}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]+$$

$$\tfrac{3}{5}(\tfrac{1}{3}-m)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)])+$$

$$2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2\,(-(8+3\,m)\,(-\tfrac{5}{7}(\tfrac{11}{3}+m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{1}{3}-m,\tfrac{14}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]$$

$$\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]+\tfrac{5}{7}(\tfrac{1}{3}-m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{4}{3}-m,\tfrac{11}{3}+m,\tfrac{9}{2},$$

$$\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)])+(1-3\,m)$$

$$(-\tfrac{5}{7}(\tfrac{8}{3}+m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{4}{3}-m,\tfrac{11}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]+$$

$$\tfrac{5}{7}(\tfrac{4}{3}-m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{7}{3}-m,\tfrac{8}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)])))))/$$

$$(15\,\text{AppellF1}[\tfrac{3}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{5}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]+2\,(-(8+3\,m)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{1}{3}-m,$$

$$\tfrac{11}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]+$$

$$(1-3\,m)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2])\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2)^2+$$

$$(21\,(A-B+C)\,\text{AppellF1}[\tfrac{5}{2},\tfrac{1}{3}-m,\tfrac{8}{3}+m,\tfrac{7}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]^4$$

$$(2\,((8+3\,m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{1}{3}-m,\tfrac{11}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]+$$

$$(-1+3\,m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2])\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]-$$

$$21\,(-\tfrac{5}{7}(\tfrac{8}{3}+m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{1}{3}-m,\tfrac{11}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)]+$$

$$\tfrac{5}{7}(\tfrac{1}{3}-m)\,\text{AppellF1}[\tfrac{7}{2},\tfrac{4}{3}-m,\tfrac{8}{3}+m,\tfrac{9}{2},\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2,-\text{Tan}[\tfrac{1}{2}(c+d\,x)]^2]\,\text{Sec}[\tfrac{1}{2}(c+d\,x)]^2\,\text{Tan}[\tfrac{1}{2}(c+d\,x)])+$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left((8+3\,m)\left(-\frac{7}{9}\left(\frac{11}{3}+m\right)\text{AppellF1}\left[\frac{9}{2},\frac{1}{3}-m,\frac{14}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$
$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{7}{9}\left(\frac{1}{3}-m\right)\text{AppellF1}\left[\frac{9}{2},\frac{4}{3}-m,\frac{11}{3}+m,\frac{11}{2},\right.$$
$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(-1+3\,m)$$
$$\left(-\frac{7}{9}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{9}{2},\frac{4}{3}-m,\frac{11}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$
$$\left.\left.\left.\left.\frac{7}{9}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{9}{2},\frac{7}{3}-m,\frac{8}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)\Big/$$
$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\left((8+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{3}-m,\right.\right.\right.$$
$$\left.\frac{11}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$
$$\left.\left.\left.(-1+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\right)\right)$$

- **Problem 367: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(b\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

Optimal (type 5, 227 leaves, 5 steps):

$$\frac{3\,C\,\text{Cos}[c+d\,x]^{1+m}\,\text{Sin}[c+d\,x]}{d\,(4+3\,m)\,(b\,\text{Cos}[c+d\,x])^{2/3}}-$$
$$\left(3\,(C+3\,C\,m+A\,(4+3\,m))\,\text{Cos}[c+d\,x]^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{6}(1+3\,m),\frac{1}{6}(7+3\,m),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(d\,(1+3\,m)\,(4+3\,m)\,(b\,\text{Cos}[c+d\,x])^{2/3}\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\frac{3\,B\,\text{Cos}[c+d\,x]^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{6}(4+3\,m),\frac{1}{6}(10+3\,m),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]}{d\,(4+3\,m)\,(b\,\text{Cos}[c+d\,x])^{2/3}\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 7613 leaves):

$$\left(2\,\text{Cos}[c+d\,x]^{2/3}\left(\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\text{Cos}[2\,(c+d\,x)]-\right.\right.$$

$$\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[2\,(c+d\,x)]+\mathrm{Sec}[c+d\,x]\,\Bigg(\Bigg(A\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}+\frac{1}{2}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\Bigg)\,\mathrm{Cos}[2\,(c+d\,x)]^2-$$
$$\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Cos}[3\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]-\frac{1}{4}\,\mathrm{i}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Cos}[4\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]+$$
$$\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[c+d\,x]\,\mathrm{Sin}[2\,(c+d\,x)]+\Bigg(A\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}+\frac{1}{2}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\Bigg)\,\mathrm{Sin}[2\,(c+d\,x)]^2+$$
$$\mathrm{Cos}[2\,(c+d\,x)]\,\Bigg(\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Cos}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Cos}[4\,(c+d\,x)]+$$
$$\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[c+d\,x]+\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,\mathrm{i}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[4\,(c+d\,x)]\Bigg)+$$
$$\mathrm{Sin}[2\,(c+d\,x)]\,\Bigg(-\frac{1}{4}\,\mathrm{i}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{3}+m}\,\mathrm{Sin}[4\,(c+d\,x)]\Bigg)\Bigg)\Bigg)$$

$$\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\Big(1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{2}{3}+m}\,\left(\frac{1}{1+\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\right)^{\frac{7}{3}+m}$$
$$\Bigg(\Bigg(45\,(A+B+C)\,\mathrm{AppellF1}\Big[\frac{1}{2},\,\frac{2}{3}-m,\,\frac{7}{3}+m,\,\frac{3}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\Big/$$
$$\Bigg(9\,\mathrm{AppellF1}\Big[\frac{1}{2},\,\frac{2}{3}-m,\,\frac{7}{3}+m,\,\frac{3}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-2\,\Bigg((7+3\,m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{2}{3}-m,\,\frac{10}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,$$
$$-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-2+3\,m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{5}{3}-m,\,\frac{7}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)+$$
$$\Bigg(50\,(A-C)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{2}{3}-m,\,\frac{7}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)\Big/$$
$$\Bigg(15\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{2}{3}-m,\,\frac{7}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-$$
$$2\,\Bigg((7+3\,m)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{2}{3}-m,\,\frac{10}{3}+m,\,\frac{7}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$
$$(-2+3\,m)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{5}{3}-m,\,\frac{7}{3}+m,\,\frac{7}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Bigg)\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg)-$$
$$\Bigg(21\,(A-B+C)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{2}{3}-m,\,\frac{7}{3}+m,\,\frac{7}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/$$
$$\Bigg(-21\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{2}{3}-m,\,\frac{7}{3}+m,\,\frac{7}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$
$$2\,\Bigg((7+3\,m)\,\mathrm{AppellF1}\Big[\frac{7}{2},\,\frac{2}{3}-m,\,\frac{10}{3}+m,\,\frac{9}{2},\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)\Big)\Big)\Big/$$

$$\Bigg(5d\,(b\,\text{Cos}[c+dx])^{2/3}\Bigg(-\frac{2}{5}\left(-\frac{2}{3}+m\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{5}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{7}{3}+m}$$

$$\Bigg(\Bigg(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Big/\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-2\Bigg((7+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-2+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(50(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Big/\Bigg(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\right.$$

$$\left.\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-2\Bigg((7+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-2+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-$$

$$\Bigg(21(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4\Bigg)\Big/$$

$$\Bigg(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$2\Bigg((7+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\right.$$

$$\left.\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)+\frac{1}{5}\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{2}{3}+m}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{7}{3}+m}\Bigg(\Bigg(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Big/$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-$$

$$2\Bigg((7+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-2+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\right.$$

$$2\left((7+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.(-2+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-$$

$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$2\left((7+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)-$$

$$\frac{2}{5}\left(\frac{7}{3}+m\right)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{2}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{10}{3}+m}$$

$$\left(\left(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\right.$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\right.$$

$$2\left((7+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.(-2+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\right.$$

$$2\left((7+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.(-2+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-$$

$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$2\left((7+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-2+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{2}{5}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{2}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{7}{3}+m}$$

$$\left(\left(45\,(A+B+C)\left(-\frac{1}{3}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.\right.$$
$$\left.\left.\frac{1}{3}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$
$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$
$$2\left((7+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-2+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/$$
$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$
$$2\left((7+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-2+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(50\,(A-C)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(-\frac{3}{5}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$
$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$
$$\left.\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$

$$2\left((7+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$
$$\left.(-2+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)-$$
$$\left(42\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3\right)\Big/$$
$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$
$$2\left((7+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\right.\right.$$
$$\left.\left.\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)-\Big(21\,(A-B+C)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4$$
$$\left(-\frac{5}{7}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$
$$\left.\left.\frac{5}{7}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/$$
$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+2\left((7+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\right.\right.\right.$$
$$\left.\left.\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)$$
$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)-\Big(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$
$$\left(-2\left((7+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.\right.$$
$$\left.(-2+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$
$$9\left(-\frac{1}{3}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$
$$\left.\frac{1}{3}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)-$$
$$2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left((7+3m)\left(-\frac{3}{5}\left(\frac{10}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{13}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.\right.$$
$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{10}{3}+m,\frac{7}{2},\right.$$
$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-2+3m)$$

$$\left(-\frac{3}{5}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{5}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{8}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-2\left((7+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{5}{2},\right.\right.\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-2+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2-\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(-2\left((7+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.\right.$$

$$\left.(-2+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$15\left(-\frac{3}{5}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)-$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left((7+3m)\left(-\frac{5}{7}\left(\frac{10}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{13}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{5}{7}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{10}{3}+m,\frac{9}{2},\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-2+3m)$$

$$\left(-\frac{5}{7}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{5}{7}\left(\frac{5}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{8}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-2\left((7+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\right.\right.\right.$$

$$\left.\frac{10}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\left.\left.(-2+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2+$$

$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4\right.$$

$$\Bigg(2\,\Bigg((7+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$21\,\Bigg(-\frac{5}{7}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{2}{3}-m,\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\frac{5}{7}\left(\frac{2}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\,\Bigg((7+3m)\,\Bigg(-\frac{7}{9}\left(\frac{10}{3}+m\right)\text{AppellF1}\left[\frac{9}{2},\frac{2}{3}-m,\frac{13}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{7}{9}\left(\frac{2}{3}-m\right)\text{AppellF1}\Bigg[\frac{9}{2},\frac{5}{3}-m,\frac{10}{3}+m,\frac{11}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg]\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)+(-2+3m)$$

$$\Bigg(-\frac{7}{9}\left(\frac{7}{3}+m\right)\text{AppellF1}\left[\frac{9}{2},\frac{5}{3}-m,\frac{10}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\frac{7}{9}\left(\frac{5}{3}-m\right)\text{AppellF1}\left[\frac{9}{2},\frac{8}{3}-m,\frac{7}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{2}{3}-m,\frac{7}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\,\Bigg((7+3m)\,\text{AppellF1}\Bigg[\frac{7}{2},\frac{2}{3}-m,$$

$$\frac{10}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg]+$$

$$(-2+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{3}-m,\frac{7}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)^2\Bigg)\Bigg)$$

- **Problem 368: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(b\,\text{Cos}[c+d\,x])^{4/3}}\,dx$$

Optimal (type 5, 235 leaves, 5 steps):

$$\frac{3\,C\,\mathrm{Cos}[c+d\,x]^m\,\mathrm{Sin}[c+d\,x]}{b\,d\,(2+3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}}-$$
$$\left(3\,(C\,(1-3\,m)-A\,(2+3\,m))\,\mathrm{Cos}[c+d\,x]^m\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{6}\,(-1+3\,m),\,\frac{1}{6}\,(5+3\,m),\,\mathrm{Cos}[c+d\,x]^2\right]\,\mathrm{Sin}[c+d\,x]\right)\Big/$$
$$\left(b\,d\,(1-3\,m)\,(2+3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\sqrt{\mathrm{Sin}[c+d\,x]^2}\right)-$$
$$\frac{3\,B\,\mathrm{Cos}[c+d\,x]^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{6}\,(2+3\,m),\,\frac{1}{6}\,(8+3\,m),\,\mathrm{Cos}[c+d\,x]^2\right]\,\mathrm{Sin}[c+d\,x]}{b\,d\,(2+3\,m)\,(b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

Result (type 6, 7623 leaves) :

$$\left(2\,\mathrm{Cos}[c+d\,x]^{4/3}\,\left(\mathrm{Sec}[c+d\,x]\,\left(\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Cos}[2\,(c+d\,x)]-\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[2\,(c+d\,x)]\right)+\right.\right.$$
$$\mathrm{Sec}[c+d\,x]^2\,\left(\left(A\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\right)\,\mathrm{Cos}[2\,(c+d\,x)]^2-\right.$$
$$\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Cos}[3\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]-\frac{1}{4}\,i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Cos}[4\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]+$$
$$\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[c+d\,x]\,\mathrm{Sin}[2\,(c+d\,x)]+\left(A\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\right)\,\mathrm{Sin}[2\,(c+d\,x)]^2+$$
$$\mathrm{Cos}[2\,(c+d\,x)]\,\left(\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Cos}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Cos}[4\,(c+d\,x)]+\right.$$
$$\left.\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[c+d\,x]+\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[4\,(c+d\,x)]\right)+$$
$$\left.\left.\mathrm{Sin}[2\,(c+d\,x)]\,\left(-\frac{1}{4}\,i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{2}{3}+m}\,\mathrm{Sin}[4\,(c+d\,x)]\right)\right)\right)$$
$$\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{4}{3}+m}\,\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{\frac{5}{3}+m}$$
$$\left(\left(45\,(A+B+C)\,\mathrm{AppellF1}\left[\frac{1}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/\right.$$
$$\left(9\,\mathrm{AppellF1}\left[\frac{1}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]-2\,\left((5+3\,m)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.\right.$$
$$\left.\left.-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-4+3\,m)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$
$$\left(50\,(A-C)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\Big/$$

$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-\right.$$
$$2\left((5+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-$$
$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$
$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$2\left((5+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)\Big/$$

$$\left(5\,d\,(b\,\text{Cos}[c+d\,x])^{4/3}\left(-\frac{2}{5}\left(-\frac{4}{3}+m\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{7}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{5}{3}+m}\right.\right.$$
$$\left(\left(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\right.\right.\right.$$
$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-2\left((5+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$
$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Big/\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\right.\right.$$
$$\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-2\left((5+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-$$
$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$
$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$2\left((5+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-4+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)+\frac{1}{5}\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{4}{3}+m}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{5}{3}+m}\Bigg(\Bigg(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Big/$$

$$\Bigg(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-$$

$$2\left((5+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.(-4+3m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(50(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Big/$$

$$\Bigg(15\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-$$

$$2\left((5+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.(-4+3m)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-$$

$$\Bigg(21(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4\Bigg)\Big/$$

$$\Bigg(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$2\left((5+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.(-4+3m)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)-$$

$$\frac{2}{5}\left(\frac{5}{3}+m\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{4}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{8}{3}+m}$$

$$\Bigg(\Bigg(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Big/$$

$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\right.$$
$$2\left((5+3 m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3 m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$
$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$
$$\left(15\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\right.$$
$$2\left((5+3 m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3 m)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-$$
$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$
$$\left(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$2\left((5+3 m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.\left.(-4+3 m)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)+$$
$$\frac{2}{5}\text{Tan}\left[\frac{1}{2}(c+d x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{4}{3}+m}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{5}{3}+m}$$
$$\left(\left(45\,(A+B+C)\left(-\frac{1}{3}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.\right.\right.$$
$$\left.\left.\frac{1}{3}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/$$
$$\left(9\,\text{AppellF1}\left[\frac{1}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\right.$$
$$2\left((5+3 m)\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$
$$\left.\left.(-4+3 m)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\Big(50\,(A-C)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big/$$

$$\Big(15\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-$$

$$2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-4+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(50\,(A-C)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(-\frac{3}{5}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+\frac{3}{5}\,\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big/\Big(15\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-$$

$$2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-4+3\,m)\,\text{AppellF1}\Big[$$

$$\frac{5}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)-$$

$$\Big(42\,(A-B+C)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3\Big)\Big/$$

$$\Big(-21\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-4+3\,m)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{7}{3}-m,$$

$$\frac{5}{3}+m,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)-\Big(21\,(A-B+C)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4$$

$$\Big(-\frac{5}{7}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{5}{7}\,\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big/$$

$$\Big(-21\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{9}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-4+3\,m)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)-\Big(45\,(A+B+C)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\Big(-2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-4+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$9\,\Big(-\frac{1}{3}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{1}{3}\,\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)-$$

$$2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big((5+3\,m)\,\Big(-\frac{3}{5}\,\Big(\frac{8}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{11}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+\frac{3}{5}\,\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)+(-4+3\,m)$$

$$\Big(-\frac{3}{5}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{3}{5}\,\Big(\frac{7}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{10}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big(9\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]-2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{5}{2},$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+(-4+3\,m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^2-\Big(50\,(A-C)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{4}{3}-m,\,\frac{5}{3}+m,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(-2\,\Big((5+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-4+3\,m)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$15\,\Big(-\frac{3}{5}\,\Big(\frac{5}{3}+m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{4}{3}-m,\,\frac{8}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$\frac{3}{5}\,\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{7}{3}-m,\,\frac{5}{3}+m,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big)-$$

$$2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big((5+3\,m)\,\Big(-\frac{5}{7}\,\Big(\frac{8}{3}+m\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{4}{3}-m,\,\frac{11}{3}+m,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+\frac{5}{7}\,\Big(\frac{4}{3}-m\Big)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{7}{3}-m,\,\frac{8}{3}+m,\,\frac{9}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)+(-4+3\,m)$$

$$\left(-\frac{5}{7}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{5}{7}\left(\frac{7}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{10}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(15\,\text{AppellF1}\left[\frac{3}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-2\,\Bigg((5+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\right.$$

$$\left.\frac{8}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-4+3\,m)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)^2+$$

$$\Bigg(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4$$

$$\Bigg(2\,\Bigg((5+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-4+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$21\left(-\frac{5}{7}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{5}{7}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$

$$2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg((5+3\,m)\left(-\frac{7}{9}\left(\frac{8}{3}+m\right)\text{AppellF1}\left[\frac{9}{2},\frac{4}{3}-m,\frac{11}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{7}{9}\left(\frac{4}{3}-m\right)\text{AppellF1}\left[\frac{9}{2},\frac{7}{3}-m,\frac{8}{3}+m,\frac{11}{2},\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(-4+3\,m)$$

$$\left(-\frac{7}{9}\left(\frac{5}{3}+m\right)\text{AppellF1}\left[\frac{9}{2},\frac{7}{3}-m,\frac{8}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{7}{9}\right.$$

$$\left.\left(\frac{7}{3}-m\right)\text{AppellF1}\left[\frac{9}{2},\frac{10}{3}-m,\frac{5}{3}+m,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-21\,\text{AppellF1}\left[\frac{5}{2},\frac{4}{3}-m,\frac{5}{3}+m,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+2\,\Bigg((5+3\,m)\,\text{AppellF1}\left[\frac{7}{2},\frac{4}{3}-m,\right.$$

$$\left.\frac{8}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\left.\left.\left.(-4+3\,m)\ \text{AppellF1}\left[\frac{7}{2},\frac{7}{3}-m,\frac{5}{3}+m,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\right)\right)$$

■ **Problem 369: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 5, 227 leaves, 5 steps):

$$\frac{C\,(a\,\text{Cos}[c+d\,x])^{1+m}\,(b\,\text{Cos}[c+d\,x])^n\,\text{Sin}[c+d\,x]}{a\,d\,(2+m+n)}-$$
$$\left((C\,(1+m+n)+A\,(2+m+n))\,(a\,\text{Cos}[c+d\,x])^{1+m}\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}(1+m+n),\frac{1}{2}(3+m+n),\text{Cos}[c+d\,x]^2\right]\right.$$
$$\left.\text{Sin}[c+d\,x]\right)\Big/\left(a\,d\,(1+m+n)\,(2+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\left(B\,(a\,\text{Cos}[c+d\,x])^{2+m}\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}(2+m+n),\frac{1}{2}(4+m+n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(a^2\,d\,(2+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)$$

Result (type 5, 545 leaves):

$$\frac{1}{4\,d}C\,\text{Cos}[c+d\,x]^{-m-n}\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n$$
$$\left(1/(2+m+n)\,\mathbb{i}\,2^{-m-n}\,e^{-2\,\mathbb{i}\,(c+d\,x)}\left(e^{-\mathbb{i}\,(c+d\,x)}+e^{\mathbb{i}\,(c+d\,x)}\right)^{m+n}\left(1+e^{2\,\mathbb{i}\,(c+d\,x)}\right)^{-m-n}\text{Hypergeometric2F1}\left[-m-n,-1-\frac{m}{2}-\frac{n}{2},-\frac{m}{2}-\frac{n}{2},-e^{2\,\mathbb{i}\,(c+d\,x)}\right]+\right.$$
$$\left.1/(-2+m+n)\,\mathbb{i}\,2^{-m-n}\,e^{2\,\mathbb{i}\,(c+d\,x)}\left(e^{-\mathbb{i}\,(c+d\,x)}+e^{\mathbb{i}\,(c+d\,x)}\right)^{m+n}\left(1+e^{2\,\mathbb{i}\,(c+d\,x)}\right)^{-m-n}\text{Hypergeometric2F1}\left[-m-n,1-\frac{m}{2}-\frac{n}{2},2-\frac{m}{2}-\frac{n}{2},-e^{2\,\mathbb{i}\,(c+d\,x)}\right]\right)-$$
$$\left(A\,\text{Cos}[c+d\,x]\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}(1+m+n),\frac{1}{2}(3+m+n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(d\,(1+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\left(C\,\text{Cos}[c+d\,x]\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}(1+m+n),\frac{1}{2}(3+m+n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(2\,d\,(1+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)-$$
$$\left(B\,\text{Cos}[c+d\,x]^2\,(a\,\text{Cos}[c+d\,x])^m\,(b\,\text{Cos}[c+d\,x])^n\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}(2+m+n),\frac{1}{2}(4+m+n),\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(d\,(2+m+n)\,\sqrt{\text{Sin}[c+d\,x]^2}\right)$$

- **Problem 370: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d x]^2 \, (b \,\text{Cos}[c+d x])^n \left(A+B \,\text{Cos}[c+d x]+C \,\text{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 187 leaves, 5 steps):

$$\frac{C \,(b \,\text{Cos}[c+d x])^{3+n} \,\text{Sin}[c+d x]}{b^3 d \,(4+n)}-\frac{(C \,(3+n)+A \,(4+n)) \,(b \,\text{Cos}[c+d x])^{3+n} \,\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3+n}{2}, \frac{5+n}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{b^3 d \,(3+n) \,(4+n) \sqrt{\text{Sin}[c+d x]^2}}-$$
$$\frac{B \,(b \,\text{Cos}[c+d x])^{4+n} \,\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{4+n}{2}, \frac{6+n}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{b^4 d \,(4+n) \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 6, 29 753 leaves): Display of huge result suppressed!

- **Problem 372: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (b \,\text{Cos}[c+d x])^n \left(A+B \,\text{Cos}[c+d x]+C \,\text{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 187 leaves, 4 steps):

$$\frac{C \,(b \,\text{Cos}[c+d x])^{1+n} \,\text{Sin}[c+d x]}{b d \,(2+n)}-\frac{(C \,(1+n)+A \,(2+n)) \,(b \,\text{Cos}[c+d x])^{1+n} \,\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+n}{2}, \frac{3+n}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{b d \,(1+n) \,(2+n) \sqrt{\text{Sin}[c+d x]^2}}-$$
$$\frac{B \,(b \,\text{Cos}[c+d x])^{2+n} \,\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+n}{2}, \frac{4+n}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{b^2 d \,(2+n) \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 5, 441 leaves):

$$\frac{1}{4d}C\,\mathrm{Cos}[c+d\,x]^{-n}\,(b\,\mathrm{Cos}[c+d\,x])^n$$
$$\left(1/(2+n)\,i\,2^{-n}\,e^{-2i(c+dx)}\left(e^{-i(c+dx)}+e^{i(c+dx)}\right)^n\left(1+e^{2i(c+dx)}\right)^{-n}\,\mathrm{Hypergeometric2F1}\left[-1-\frac{n}{2},\,-n,\,-\frac{n}{2},\,-e^{2i(c+dx)}\right]+\right.$$
$$\left.1/(-2+n)\,i\,2^{-n}\,e^{2i(c+dx)}\left(e^{-i(c+dx)}+e^{i(c+dx)}\right)^n\left(1+e^{2i(c+dx)}\right)^{-n}\,\mathrm{Hypergeometric2F1}\left[1-\frac{n}{2},\,-n,\,2-\frac{n}{2},\,-e^{2i(c+dx)}\right]\right)-$$
$$\frac{A\,\mathrm{Cos}[c+d\,x]\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+n}{2},\frac{3+n}{2},\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{d\,(1+n)\sqrt{\mathrm{Sin}[c+d\,x]^2}}-$$
$$\frac{C\,\mathrm{Cos}[c+d\,x]\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+n}{2},\frac{3+n}{2},\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{2\,d\,(1+n)\sqrt{\mathrm{Sin}[c+d\,x]^2}}-$$
$$\frac{B\,\mathrm{Cos}[c+d\,x]^2\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+n}{2},\frac{4+n}{2},\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{d\,(2+n)\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

- **Problem 379: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\mathrm{Cos}[c+d\,x])^n\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 5, 221 leaves, 5 steps):

$$\frac{2\,C\sqrt{\mathrm{Cos}[c+d\,x]}\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Sin}[c+d\,x]}{d\,(3+2\,n)}-$$
$$\left(2\,(C+2\,C\,n+A\,(3+2\,n))\sqrt{\mathrm{Cos}[c+d\,x]}\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(1+2\,n),\frac{1}{4}(5+2\,n),\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]\right)\Big/$$
$$\left(d\,(1+2\,n)\,(3+2\,n)\sqrt{\mathrm{Sin}[c+d\,x]^2}\right)-$$
$$\left(2\,B\,\mathrm{Cos}[c+d\,x]^{3/2}\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(3+2\,n),\frac{1}{4}(7+2\,n),\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]\right)\Big/\left(d\,(3+2\,n)\sqrt{\mathrm{Sin}[c+d\,x]^2}\right)$$

Result (type 6, 7602 leaves):

$$\left(2\,\mathrm{Cos}[c+d\,x]^{-n}\,(b\,\mathrm{Cos}[c+d\,x])^n\right.$$
$$\left(\frac{1}{2}B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[2\,(c+d\,x)]-\frac{1}{2}i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[2\,(c+d\,x)]+\mathrm{Sec}[c+d\,x]\left(\left(A\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\right)\right.\right.$$
$$\mathrm{Cos}[2\,(c+d\,x)]^2-\frac{1}{2}i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[3\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]-\frac{1}{4}i\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[4\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]+$$

$$\frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[c+d x] \operatorname{Sin}[2 (c+d x)] + \left(A \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} + \frac{1}{2} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}\right) \operatorname{Sin}[2 (c+d x)]^2 +$$

$$\operatorname{Cos}[2 (c+d x)] \left(\frac{1}{4} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} + \frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[3 (c+d x)] + \frac{1}{4} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[4 (c+d x)] + \right.$$

$$\left. \frac{1}{2} i B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[c+d x] + \frac{1}{2} i B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[3 (c+d x)] + \frac{1}{4} i C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[4 (c+d x)]\right) +$$

$$\left.\left.\left. \operatorname{Sin}[2 (c+d x)] \left(-\frac{1}{4} i C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} + \frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[3 (c+d x)] + \frac{1}{4} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[4 (c+d x)]\right)\right)\right)\right)$$

$$\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right] \left(1 - \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)^{-\frac{1}{2}+n} \left(\frac{1}{1+\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2}\right)^{\frac{5}{2}+n}$$

$$\left(\left(45 (A+B+C) \operatorname{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \Big/ \right.$$

$$\left(3 \operatorname{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{3}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \left(-(5+2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, \right.\right.$$

$$\left.\left. -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + (1-2 n) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) +$$

$$\left(50 (A-C) \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) \Big/$$

$$\left(5 \operatorname{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \right.$$

$$\left(-(5+2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \right.$$

$$\left.\left. (1-2 n) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right) -$$

$$\left(21 (A-B+C) \operatorname{AppellF1}\left[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left(-7 \operatorname{AppellF1}\left[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \right.$$

$$\left((5+2 n) \operatorname{AppellF1}\left[\frac{7}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{9}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right] + \right.$$

$$\left.\left.\left.(-1+2 n) \operatorname{AppellF1}\left[\frac{7}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{9}{2}, \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2, -\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right]\right) \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2\right)\right) \Big/$$

$$\Bigg(15\,d\,\Bigg(-\frac{2}{15}\left(-\frac{1}{2}+n\right)\operatorname{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{3}{2}+n}\left(\frac{1}{1+\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{5}{2}+n}$$

$$\Bigg(\Bigg(45\,(A+B+C)\,\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{3}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\Bigg/\Bigg(3\,\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{3}{2},\right.$$

$$\left.\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\Bigg(-(5+2\,n)\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(1-2\,n)\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(50\,(A-C)\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)\Bigg/\Bigg(5\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\right.$$

$$\left.\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\Bigg(-(5+2\,n)\,\operatorname{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(1-2\,n)\,\operatorname{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)-$$

$$\Bigg(21\,(A-B+C)\,\operatorname{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\Bigg(-7\,\operatorname{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg((5+2\,n)\,\operatorname{AppellF1}\left[\frac{7}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{9}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\,\operatorname{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\right.$$

$$\left.\frac{9}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)\Bigg)+\frac{1}{15}\operatorname{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\left(1-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}$$

$$\left(\frac{1}{1+\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{5}{2}+n}\Bigg(\Bigg(45\,(A+B+C)\,\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{3}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\Bigg/$$

$$\Bigg(3\,\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{3}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg(-(5+2\,n)\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(1-2\,n)\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(50\,(A-C)\,\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\operatorname{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)\Bigg/$$

$$\Big(5\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big(-(5+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{2}-n,\,\frac{7}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(1-2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{3}{2}-n,\,\frac{5}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)-$$

$$\Big(21\,(A-B+C)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Big)\Big/$$

$$\Big(-7\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big((5+2\,n)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{1}{2}-n,\,\frac{7}{2}+n,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(-1+2\,n)\,\text{AppellF1}\Big[\frac{7}{2},\,\frac{3}{2}-n,\,\frac{5}{2}+n,\,\frac{9}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big)-$$

$$\frac{2}{15}\,\Big(\frac{5}{2}+n\Big)\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Big(1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{-\frac{1}{2}+n}\,\left(\frac{1}{1+\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}\right)^{\frac{7}{2}+n}$$

$$\Big(\Big(45\,(A+B+C)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\Big/$$

$$\Big(3\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{3}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big(-(5+2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{7}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(1-2\,n)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{5}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)+$$

$$\Big(50\,(A-C)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)\Big/$$

$$\Big(5\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{5}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$\Big(-(5+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{2}-n,\,\frac{7}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]+$$

$$(1-2\,n)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{3}{2}-n,\,\frac{5}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)-$$

$$\Big(21\,(A-B+C)\,\text{AppellF1}\Big[\frac{5}{2},\,\frac{1}{2}-n,\,\frac{5}{2}+n,\,\frac{7}{2},\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2,\,-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Big)\Big/$$

$$\left(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((5+2\,n)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)+$$

$$\frac{2}{15}\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{-\frac{1}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{5}{2}+n}$$

$$\left(\left(45\,(A+B+C)\left(-\frac{1}{3}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.\right.$$

$$\left.\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left(-(5+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Big/$$

$$\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left(-(5+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(1-2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\left(-\frac{3}{5}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left(-(5+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(1-2\,n)\,\text{AppellF1}\left[\right.\right.$$

$$\frac{5}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Big) \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) -$$

$$\Big(42 (A-B+C) \mathrm{AppellF1}\Big[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3\Big) \Big/$$

$$\Big(-7 \mathrm{AppellF1}\Big[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] +$$

$$\Big((5+2 n) \mathrm{AppellF1}\Big[\frac{7}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{9}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] + (-1+2 n) \mathrm{AppellF1}\Big[\frac{7}{2}, \frac{3}{2}-n,$$

$$\frac{5}{2}+n, \frac{9}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Big) \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) - \Big(21 (A-B+C) \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^4$$

$$\Big(-\frac{5}{7}\left(\frac{5}{2}+n\right) \mathrm{AppellF1}\Big[\frac{7}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{9}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$\frac{5}{7}\left(\frac{1}{2}-n\right) \mathrm{AppellF1}\Big[\frac{7}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{9}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\Big)\Big) \Big/$$

$$\Big(-7 \mathrm{AppellF1}\Big[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] + \Big((5+2 n) \mathrm{AppellF1}\Big[\frac{7}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{9}{2},$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] + (-1+2 n) \mathrm{AppellF1}\Big[\frac{7}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{9}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Big)$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big) - \Big(45 (A+B+C) \mathrm{AppellF1}\Big[\frac{1}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{3}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]$$

$$\Big(\Big(-(5+2 n) \mathrm{AppellF1}\Big[\frac{3}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{5}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] +$$

$$(1-2 n) \mathrm{AppellF1}\Big[\frac{3}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Big) \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$3\Big(-\frac{1}{3}\left(\frac{5}{2}+n\right) \mathrm{AppellF1}\Big[\frac{3}{2}, \frac{1}{2}-n, \frac{7}{2}+n, \frac{5}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$\frac{1}{3}\left(\frac{1}{2}-n\right) \mathrm{AppellF1}\Big[\frac{3}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{5}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\Big) +$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \Big(-(5+2 n)\Big(-\frac{3}{5}\left(\frac{7}{2}+n\right) \mathrm{AppellF1}\Big[\frac{5}{2}, \frac{1}{2}-n, \frac{9}{2}+n, \frac{7}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{1}{2}-n\right) \mathrm{AppellF1}\Big[\frac{5}{2}, \frac{3}{2}-n, \frac{7}{2}+n, \frac{7}{2},$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\Big) + (1-2 n)$$

$$\Big(-\frac{3}{5}\left(\frac{5}{2}+n\right) \mathrm{AppellF1}\Big[\frac{5}{2}, \frac{3}{2}-n, \frac{7}{2}+n, \frac{7}{2}, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\Bigg(-(5+2\,n)\,\text{AppellF1}\Bigg[\frac{3}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{5}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg]+(1-2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)^2-\Bigg(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg(\Bigg(-(5+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(1-2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$5\Bigg(-\frac{3}{5}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg(-(5+2\,n)\Bigg(-\frac{5}{7}\left(\frac{7}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{1}{2}-n,\frac{9}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{5}{7}\left(\frac{1}{2}-n\right)\text{AppellF1}\Bigg[\frac{7}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{9}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)+(1-2\,n)$$

$$\Bigg(-\frac{5}{7}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$\frac{5}{7}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(5\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\Bigg(-(5+2\,n)\,\text{AppellF1}\Bigg[\frac{5}{2},\frac{1}{2}-n,$$

$$\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg]+$$

$$(1-2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)^2+$$

$$\Bigg(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4$$

$$\Bigg(\Bigg((5+2\,n)\,\text{AppellF1}\left[\frac{7}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]-$$
$$7\left(-\frac{5}{7}\left(\frac{5}{2}+n\right)\text{AppellF1}\Big[\frac{7}{2},\frac{1}{2}-n,\frac{7}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]+\right.$$
$$\left.\frac{5}{7}\left(\frac{1}{2}-n\right)\text{AppellF1}\Big[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]\right)+$$
$$\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\left((5+2n)\left(-\frac{7}{9}\left(\frac{7}{2}+n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{1}{2}-n,\frac{9}{2}+n,\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\right.\right.$$
$$\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]+\frac{7}{9}\left(\frac{1}{2}-n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{11}{2},$$
$$\left.\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]\right)+(-1+2n)$$
$$\left(-\frac{7}{9}\left(\frac{5}{2}+n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]+\right.$$
$$\left.\left.\left.\left.\frac{7}{9}\left(\frac{3}{2}-n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+dx)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]\right)\right)\right)\right)\Big/$$
$$\left(-7\,\text{AppellF1}\Big[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]+\left((5+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{1}{2}-n,\right.\right.$$
$$\frac{7}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]+$$
$$\left.\left.(-1+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\Big]\right)\text{Tan}\Big[\frac{1}{2}(c+dx)\Big]^2\right)^2\Bigg)\Bigg)$$

- **Problem 380: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\text{Cos}[c+dx])^n\,\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\text{Cos}[c+dx]^{3/2}}\,dx$$

Optimal (type 5, 217 leaves, 5 steps):

$$\frac{2\,C\,(b\,\text{Cos}[c+dx])^n\,\text{Sin}[c+dx]}{d\,(1+2n)\,\sqrt{\text{Cos}[c+dx]}}+$$
$$\left(2\,(A-C\,(1-2n)+2\,A\,n)\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\frac{1}{4}(-1+2n),\frac{1}{4}(3+2n),\text{Cos}[c+dx]^2\Big]\,\text{Sin}[c+dx]\right)\Big/$$
$$\left(d\,\left(1-4n^2\right)\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sin}[c+dx]^2}\right)-$$
$$\left(2\,B\,\sqrt{\text{Cos}[c+dx]}\,(b\,\text{Cos}[c+dx])^n\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\frac{1}{4}(1+2n),\frac{1}{4}(5+2n),\text{Cos}[c+dx]^2\Big]\,\text{Sin}[c+dx]\right)\Big/\left(d\,(1+2n)\,\sqrt{\text{Sin}[c+dx]^2}\right)$$

Result (type 6, 7612 leaves):

$$\Bigg(2\,\text{Cos}[c+d\,x]^{-n}\,(b\,\text{Cos}[c+d\,x])^n\,\Bigg(\text{Sec}[c+d\,x]\,\left(\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[2\,(c+d\,x)]-\frac{1}{2}\,\mathrm{i}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[2\,(c+d\,x)]\right)+$$

$$\text{Sec}[c+d\,x]^2\,\Bigg(\left(A\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\right)\,\text{Cos}[2\,(c+d\,x)]^2-$$

$$\frac{1}{2}\,\mathrm{i}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[3\,(c+d\,x)]\,\text{Sin}[2\,(c+d\,x)]-\frac{1}{4}\,\mathrm{i}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[4\,(c+d\,x)]\,\text{Sin}[2\,(c+d\,x)]+$$

$$\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[c+d\,x]\,\text{Sin}[2\,(c+d\,x)]+\left(A\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\right)\,\text{Sin}[2\,(c+d\,x)]^2+$$

$$\text{Cos}[2\,(c+d\,x)]\,\Bigg(\frac{1}{4}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Cos}[4\,(c+d\,x)]+$$

$$\frac{1}{2}\,\mathrm{i}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[c+d\,x]+\frac{1}{2}\,\mathrm{i}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,\mathrm{i}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[4\,(c+d\,x)]\Bigg)+$$

$$\text{Sin}[2\,(c+d\,x)]\,\left(-\frac{1}{4}\,\mathrm{i}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,B\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\text{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\text{Sin}[4\,(c+d\,x)]\right)\Bigg)\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{3}{2}+n}\,\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{\frac{3}{2}+n}$$

$$\Bigg(\left(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]-\Bigg((3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(-3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)+$$

$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\Big/$$

$$\Bigg(5\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]-$$

$$\Bigg((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+$$

$$(-3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\Bigg)-$$

$$\left(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((3+2 n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Bigg)\Bigg/$$

$$\left(15\,d\left(-\frac{2}{15}\left(-\frac{3}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{5}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{3}{2}+n}\right.\right.$$

$$\left(\left(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((3+2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(50(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$

$$\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-$$

$$\left(21(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\left((3+2 n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Bigg)+\frac{1}{15}\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{3}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{3}{2}+n}\left(\left(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((3+2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$

$$-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$

$$\left(5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((3+2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$

$$-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-$$

$$\left(21\,(A-B+C)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left(-7\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left((3+2 n)\,\mathrm{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left.\left.(-3+2 n)\,\mathrm{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)-$$

$$\frac{2}{15}\left(\frac{3}{2}+n\right)\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\left(1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{-\frac{3}{2}+n}\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{\frac{5}{2}+n}$$

$$\left(\left(45\,(A+B+C)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((3+2 n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$

$$-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\Big/$$

$$\left(5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\left((3+2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.\right.$$

$$-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-$$

$$\left(21\,(A-B+C)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left(-7\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\right.$$

$$\left((3+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$
$$\left.\left.(-3+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)+$$
$$\frac{2}{15}\text{Tan}\left[\frac{1}{2}(c+dx)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{3}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{3}{2}+n}$$
$$\left(\left(45\,(A+B+C)\left(-\frac{1}{3}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.\right.\right.$$
$$\left.\left.\frac{1}{3}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/$$
$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-\left((3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)+$$
$$\left(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Big/$$
$$\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-\right.$$
$$\left((3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\right.\right.$$
$$\left.\left.\left.\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)+\left(50\,(A-C)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right.$$
$$\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$
$$\left.\left.\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big/$$
$$\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]-\left((3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.\right.\right.$$
$$\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)-$$
$$\left(42\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3\right)\Big/$$
$$\left(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((3+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\right.\right.$$

$$\left.\left.\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)-\Bigg(21\,(A-B+C)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4$$

$$\left(-\frac{5}{7}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\left.\frac{5}{7}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Bigg((3+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)-\Bigg(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\Bigg(-\Bigg((3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$3\left(-\frac{1}{3}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)-$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg((3+2n)\left(-\frac{3}{5}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{7}{2},\right.$$

$$\left.\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+(-3+2n)$$

$$\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]-\Bigg((3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{5}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big)^2-\Bigg(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg(-\Bigg((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+$$

$$5\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)-$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg((3+2\,n)\left(-\frac{5}{7}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{5}{7}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(-3+2\,n)\left(-\frac{5}{7}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{5}{7}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]$$

$$\left.\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg/\Bigg(5\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]-$$

$$\Bigg((3+2\,n)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-3+2\,n)\,\text{AppellF1}\Big[\frac{5}{2},$$

$$\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Big]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)^2+$$

$$\Bigg(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4$$

$$\Bigg(\Bigg((3+2\,n)\,\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-3+2\,n)\,\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$7\left(-\frac{5}{7}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$\left.\frac{5}{7}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg((3+2\,n)\left(-\frac{7}{9}\left(\frac{5}{2}+n\right)\text{AppellF1}\left[\frac{9}{2},\frac{3}{2}-n,\frac{7}{2}+n,\frac{11}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right.$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{7}{9}\left(\frac{3}{2}-n\right)\mathrm{AppellF1}\left[\frac{9}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{11}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)+(-3+2\,n)$$
$$\left(-\frac{7}{9}\left(\frac{3}{2}+n\right)\mathrm{AppellF1}\left[\frac{9}{2},\frac{5}{2}-n,\frac{5}{2}+n,\frac{11}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\frac{7}{9}\left(\frac{5}{2}-n\right)\mathrm{AppellF1}\left[\frac{9}{2},\frac{7}{2}-n,\frac{3}{2}+n,\frac{11}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)\Big/$$
$$\left(-7\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((3+2\,n)\,\mathrm{AppellF1}\left[\frac{7}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-3+2\,n)\,\mathrm{AppellF1}\left[\frac{7}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\right)\right)$$

- **Problem 381: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(b\,\mathrm{Cos}[c+d\,x])^n\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 5, 221 leaves, 5 steps):

$$-\frac{2\,C\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Sin}[c+d\,x]}{d\,(1-2\,n)\,\mathrm{Cos}[c+d\,x]^{3/2}}+\left(2\,(A+C\,(3-2\,n)-2\,A\,n)\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-3+2\,n),\frac{1}{4}(1+2\,n),\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]\right)\Big/\left(d\,(1-2\,n)\,(3-2\,n)\,\mathrm{Cos}[c+d\,x]^{3/2}\sqrt{\mathrm{Sin}[c+d\,x]^2}\right)+\frac{2\,B\,(b\,\mathrm{Cos}[c+d\,x])^n\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{4}(-1+2\,n),\frac{1}{4}(3+2\,n),\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{d\,(1-2\,n)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

Result (type 6, 14 740 leaves):

$$-\left(\left(\left(6\,\mathrm{Cos}[c+d\,x]^{-n}\,(b\,\mathrm{Cos}[c+d\,x])^n\left(\mathrm{Sec}[c+d\,x]^2\left(\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[2\,(c+d\,x)]-\frac{1}{2}\,i\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[2\,(c+d\,x)]\right)+\right.\right.\right.\right.$$
$$\mathrm{Sec}[c+d\,x]^3\left(\left(A\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\right)\mathrm{Cos}[2\,(c+d\,x)]^2-\right.$$

$$\frac{1}{2}\, i\, B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[3 (c+d x)] \operatorname{Sin}[2 (c+d x)]-\frac{1}{4}\, i\, C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[4 (c+d x)] \operatorname{Sin}[2 (c+d x)]+$$

$$\frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[c+d x] \operatorname{Sin}[2 (c+d x)]+\left(A \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}\right) \operatorname{Sin}[2 (c+d x)]^2+$$

$$\operatorname{Cos}[2 (c+d x)] \Bigg(\frac{1}{4} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[3 (c+d x)]+\frac{1}{4} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Cos}[4 (c+d x)]+$$

$$\frac{1}{2}\, i\, B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[c+d x]+\frac{1}{2}\, i\, B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[3 (c+d x)]+\frac{1}{4}\, i\, C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[4 (c+d x)]\Bigg)+$$

$$\operatorname{Sin}[2 (c+d x)] \Bigg(-\frac{1}{4}\, i\, C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n}+\frac{1}{2} B \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[3 (c+d x)]+\frac{1}{4} C \operatorname{Cos}[c+d x]^{\frac{1}{2}+n} \operatorname{Sin}[4 (c+d x)]\Bigg)\Bigg)\Bigg) \operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]$$

$$\left(\frac{1-\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]^2}\right)^{\frac{1}{2}+n} \Bigg(\Bigg(A \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] \Big(-1+\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^2\Bigg)\Big/$$

$$\Bigg(-3 \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+\Bigg((1+2 n) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,$$

$$-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+(-1+2 n) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Bigg) \operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Bigg)-$$

$$\Bigg(B \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] \Big(-1+\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^2\Bigg)\Big/$$

$$\Bigg(-3 \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+\Bigg((1+2 n) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,$$

$$-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+(-1+2 n) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Bigg) \operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Bigg)+$$

$$\Bigg(C \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] \Big(-1+\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)^2\Bigg)\Big/$$

$$\Bigg(-3 \operatorname{AppellF1}\Big[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+$$

$$\Bigg((1+2 n) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+$$

$$(-1+2 n) \operatorname{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]\Bigg) \operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Bigg)+$$

$$\Bigg(4 A \operatorname{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big] \Big(-1+\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big)\Bigg)\Big/$$

$$\Bigg(-3 \operatorname{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2,-\operatorname{Tan}\Big[\frac{1}{2} (c+d x)\Big]^2\Big]+$$

$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)-$$

$$\left(2\,\text{B}\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)\Big/$$

$$\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.\left.(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)+$$

$$\left(4\,\text{A}\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\Big/\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\right.\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]+\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left.\left.\left.(-5+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)\right)\Big/$$

$$\left(d\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^3\left(-\frac{1}{\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^4}\,18\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(\frac{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{1}{2}+n}\right.\right.$$

$$\left(\left(\text{A}\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2\right)\Big/\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\right.\right.\right.$$

$$\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]+\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}\right.\right.\right.$$

$$\left.\left.(c+dx)\Big]^2\right]+(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)-$$

$$\left(\text{B}\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2\right)\Big/$$

$$\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$(-1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)+\Big(C\ \text{AppellF1}\Big[\frac{1}{2},$$

$$\frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\ \Big(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)^2\Big)\Big/\ \Big(-3\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)+\Big(4\,A\ \text{AppellF1}\Big[\frac{1}{2},$$

$$\frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\ \Big(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)\Big)\Big/\ \Big(-3\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-3+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)-$$

$$\Big(2\,B\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\ \Big(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)\Big)\Big/$$

$$\Big(-3\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{3}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{3}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-3+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)+$$

$$\Big(4\,A\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\Big/\ \Big(-3\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{5}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},$$

$$\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{5}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-5+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{7}{2}-n,\ \frac{1}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)\Big)-$$

$$\frac{1}{\Big(1-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)^3}\ 3\ \text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\ \left(\frac{1-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2}{1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2}\right)^{\frac{1}{2}+n}\ \Big(\Big(A\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,$$

$$-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\ \Big(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)^2\Big)\Big/\ \Big(-3\ \text{AppellF1}\Big[\frac{1}{2},\ \frac{1}{2}-n,\ \frac{1}{2}+n,\ \frac{3}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\ \frac{1}{2}-n,\ \frac{3}{2}+n,\ \frac{5}{2},\ \text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,\ -\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)-$$

$$\Bigg(B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\Bigg)\Big/$$

$$\Bigg(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\Bigg)\Big/$$

$$\Bigg(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(4\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Bigg)\Big/$$

$$\Bigg(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)-$$

$$\Bigg(2\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\Bigg)\Big/$$

$$\Bigg(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$\Bigg((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+$$

$$(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\Bigg)+$$

$$\Bigg(4\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\Bigg)\Big/\Bigg(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + \left((1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.(-5+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{7}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big)\Big) -$$

$$\frac{1}{\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^3}\, 6\left(\frac{1}{2}+n\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right] \left(\frac{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\left(-\frac{\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2} - \frac{\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)$$

$$\Bigg(\Bigg(A\,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2\Bigg) \Big/ \Bigg(-3\,\text{AppellF1}\Big[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n,$$

$$\frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big] + \left((1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.(-1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg) -$$

$$\left(B\,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2\right) \Big/$$

$$\left(-3\,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.\left.(-1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) +$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2\right) \Big/$$

$$\left(-3\,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.\left.(-1+2n)\,\text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) +$$

$$\left(4\,A\,\text{AppellF1}\left[\frac{1}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right) \Big/$$

$$\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/$$

$$\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-3+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)+$$

$$\left(4\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\Big/\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-5+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)-$$

$$\frac{1}{\left(1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^3}\,6\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)^{\frac{1}{2}+n}\left(\left(2\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+(-1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-\right.$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\Big/\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left((1+2\,n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$

$$\left(2\,C\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right.$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)\Big/\,\left(-3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left((1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$

$$\left(A\,\left(-\frac{1}{3}\,\left(\frac{1}{2}+n\right)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.\right.$$

$$\left.\frac{1}{3}\,\left(\frac{1}{2}-n\right)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\right)\Big/\,\left(-3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left((1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)-$$

$$\left(B\,\left(-\frac{1}{3}\,\left(\frac{1}{2}+n\right)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.\right.$$

$$\left.\frac{1}{3}\,\left(\frac{1}{2}-n\right)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\right)\Big/\,\left(-3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left((1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(-1+2\,n)\;\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$

$$\left(C\,\left(-\frac{1}{3}\,\left(\frac{1}{2}+n\right)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}-n,\,\frac{3}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.\right.$$

$$\left.\frac{1}{3}\,\left(\frac{1}{2}-n\right)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{3}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\right)\Big/\,\left(-3\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}-n,\,\frac{1}{2}+n,\,\frac{3}{2},\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)+$$

$$\Big(4\,A\,\text{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)\Big/$$

$$\Big(-3\,\text{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-3+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)-$$

$$\Big(2\,B\,\text{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)\Big/$$

$$\Big(-3\,\text{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-3+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)+$$

$$\Big(4\,A\,\Big(-\frac{1}{3}\Big(\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+$$

$$\frac{1}{3}\Big(\frac{3}{2}-n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)$$

$$\Big(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)\Big)\Big/\ \Big(-3\,\text{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\Big((1+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-3+2n)\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)-$$

$$\Big(2\,B\,\Big(-\frac{1}{3}\Big(\frac{1}{2}+n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+$$

$$\frac{1}{3}\Big(\frac{3}{2}-n\Big)\,\text{AppellF1}\Big[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big)$$

$$\Big(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big)\Big)\Big/\ \Big(-3\,\text{AppellF1}\Big[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$
$$\left.(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$
$$\Bigg(4A\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$
$$\left.\frac{1}{3}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Big/$$
$$\Bigg(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$
$$\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$
$$\left.(-5+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-$$
$$\Bigg(A\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2$$
$$\Bigg(\bigg((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$
$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\bigg)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$
$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$
$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$
$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg((1+2n)\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$
$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$
$$\left.\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-1+2n)\left(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.\right.$$
$$-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.$$
$$\left.\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg/\left(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.\right.$$
$$-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]+\left((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)^2+$$

$$\Big(B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2$$

$$\Big(\Big((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$

$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big((1+2n)\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-1+2n)\left(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.\right.$$

$$-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.$$

$$\left.\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Big)\Big)\Big)\Big)\Big/\Big(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\Big((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)^2-$$

$$\Big(C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2$$

$$\Big(\Big((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$

$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{1}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \left((1+2 n) \left(-\frac{3}{5}\left(\frac{3}{2}+n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{1}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{1}{2}-n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right) + (-1+2 n) \left(-\frac{3}{5}\left(\frac{1}{2}+n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{3}{2}-n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.$$

$$\left.\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\right)\right) \Big/ \left(-3 \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + \left((1+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$\left.\left.(-1+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2 -$$

$$\left(4 A \text{AppellF1}\left[\frac{1}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right.$$

$$\left(\left((1+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.\right.$$

$$\left.(-3+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] -$$

$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right) \text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] +\right.$$

$$\left.\frac{1}{3}\left(\frac{3}{2}-n\right) \text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right) +$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \left((1+2 n) \left(-\frac{3}{5}\left(\frac{3}{2}+n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{3}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{3}{2}-n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{5}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right) + (-3+2 n) \left(-\frac{3}{5}\left(\frac{1}{2}+n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{5}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{5}{2}-n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{7}{2}-n, \frac{1}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.$$

$$\left.\left.\left.\left.-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\right)\right) \Big/ \left(-3 \text{AppellF1}\left[\frac{1}{2}, \frac{3}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,\right.\right.$$

$$-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + \left((1+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{3}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] +\right.$$

$$(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)^2+$$

$$\Big(2\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)$$

$$\Big(\Big(\,(1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$

$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big((1+2n)\left(-\frac{3}{5}\left(\frac{3}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{3}{2}-n,\frac{5}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{3}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+(-3+2n)\left(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{5}{2}-n,\frac{3}{2}+n,\right.\right.$$

$$\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big]\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{5}{2}-n\right)$$

$$\left.\left.\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\right)\Big)\Big)\Big)\Big/$$

$$\Big(-3\,\text{AppellF1}\left[\frac{1}{2},\frac{3}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\Big((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{3}{2}-n,\frac{3}{2}+n,\right.$$

$$\left.\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-3+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,\right.$$

$$\left.-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Big)^2-\Big(4\,A\,\text{AppellF1}\left[\frac{1}{2},\frac{5}{2}-n,\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\Big(\Big((1+2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-5+2n)\,\text{AppellF1}\left[\frac{3}{2},\right.$$

$$\left.\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Big)\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-$$

$$3\left(-\frac{1}{3}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{5}{2}-n,\frac{3}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\right.$$

$$\left.\frac{1}{3}\left(\frac{5}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \left((1+2 n) \left(-\frac{3}{5}\left(\frac{3}{2}+n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{5}{2}-n, \frac{5}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{5}{2}-n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{7}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right) + (-5+2 n) \left(-\frac{3}{5}\left(\frac{1}{2}+n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{7}{2}-n, \frac{3}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] + \frac{3}{5}\left(\frac{7}{2}-n\right) \text{AppellF1}\left[\frac{5}{2}, \frac{9}{2}-n, \frac{1}{2}+n, \frac{7}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\right)\right) \Big/ \left(-3 \text{AppellF1}\left[\frac{1}{2}, \frac{5}{2}-n, \frac{1}{2}+n, \frac{3}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + \left((1+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{5}{2}-n, \frac{3}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right] + (-5+2 n) \text{AppellF1}\left[\frac{3}{2}, \frac{7}{2}-n, \frac{1}{2}+n, \frac{5}{2}, \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2, -\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2\right)\right)\right)$$

- **Problem 382: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(b \text{Cos}[c+d x])^n \left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{7/2}} \, dx$$

Optimal (type 5, 223 leaves, 5 steps):

$$-\frac{2 C (b \text{Cos}[c+d x])^n \text{Sin}[c+d x]}{d (3-2 n) \text{Cos}[c+d x]^{5/2}} + \left(2 (A (3-2 n)+C (5-2 n)) (b \text{Cos}[c+d x])^n \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{4}(-5+2 n), \frac{1}{4}(-1+2 n), \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]\right) \Big/ \left(d (3-2 n) (5-2 n) \text{Cos}[c+d x]^{5/2} \sqrt{\text{Sin}[c+d x]^2}\right) + \frac{2 B (b \text{Cos}[c+d x])^n \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{4}(-3+2 n), \frac{1}{4}(1+2 n), \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{d (3-2 n) \text{Cos}[c+d x]^{3/2} \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 6, 7597 leaves):

$$\Bigg(2 \text{Cos}[c+d x]^{-n} (b \text{Cos}[c+d x])^n \left(\text{Sec}[c+d x]^3 \left(\frac{1}{2} B \text{Cos}[c+d x]^{\frac{1}{2}+n} \text{Cos}[2 (c+d x)] - \frac{1}{2} i B \text{Cos}[c+d x]^{\frac{1}{2}+n} \text{Sin}[2 (c+d x)]\right) + \text{Sec}[c+d x]^4 \left(\left(A \text{Cos}[c+d x]^{\frac{1}{2}+n} + \frac{1}{2} C \text{Cos}[c+d x]^{\frac{1}{2}+n}\right) \text{Cos}[2 (c+d x)]^2 - \right.\right.$$

$$\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[3\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]-\frac{1}{4}\,\mathrm{i}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[4\,(c+d\,x)]\,\mathrm{Sin}[2\,(c+d\,x)]+$$

$$\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[c+d\,x]\,\mathrm{Sin}[2\,(c+d\,x)]+\left(A\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\right)\mathrm{Sin}[2\,(c+d\,x)]^2+$$

$$\mathrm{Cos}[2\,(c+d\,x)]\,\left(\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Cos}[4\,(c+d\,x)]+\right.$$

$$\left.\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[c+d\,x]+\frac{1}{2}\,\mathrm{i}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,\mathrm{i}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[4\,(c+d\,x)]\right)+$$

$$\left.\left.\mathrm{Sin}[2\,(c+d\,x)]\,\left(-\frac{1}{4}\,\mathrm{i}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}+\frac{1}{2}\,B\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{4}\,C\,\mathrm{Cos}[c+d\,x]^{\frac{1}{2}+n}\,\mathrm{Sin}[4\,(c+d\,x)]\right)\right)\right)$$

$$\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{-\frac{7}{2}+n}\,\left(\frac{1}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\left(\left(45\,(A+B+C)\,\mathrm{AppellF1}\left[\frac{1}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{3}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\mathrm{AppellF1}\left[\frac{1}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{3}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\left((1-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\right.\right.$$

$$\left.\left.-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+(7-2\,n)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{9}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)+$$

$$\left(50\,(A-C)\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\Big/$$

$$\left(5\,\mathrm{AppellF1}\left[\frac{3}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{5}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left((1-2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left.\left.(7-2\,n)\,\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{9}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)-$$

$$\left(21\,(A-B+C)\,\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left(-7\,\mathrm{AppellF1}\left[\frac{5}{2},\,\frac{7}{2}-n,\,-\frac{1}{2}+n,\,\frac{7}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$\left((-1+2\,n)\,\mathrm{AppellF1}\left[\frac{7}{2},\,\frac{7}{2}-n,\,\frac{1}{2}+n,\,\frac{9}{2},\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2,\,-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right]+\right.$$

$$(-7+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(15\,d\Bigg(-\frac{2}{15}\left(-\frac{7}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{9}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\Bigg(\Bigg(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Bigg/\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\right.$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\Bigg((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg/$$

$$\Bigg(5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((1-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(7-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-$$

$$\Bigg(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4\Bigg)\Bigg/$$

$$\Bigg(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((-1+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+(-7+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\right.$$

$$\left.\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)+\frac{1}{15}\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{7}{2}+n}$$

$$\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{-\frac{1}{2}+n}\Bigg(\Bigg(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)+$$

$$\left(50(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\Big/$$

$$\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((1-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$(7-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)-$$

$$\left(21(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((-1+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$(-7+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\right)-$$

$$\frac{2}{15}\left(-\frac{1}{2}+n\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{7}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{\frac{1}{2}+n}$$

$$\left(\left(45(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\Big/\right.$$

$$\left(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right)\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)+$$

$$\left(50(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\Big/$$

$$\left(5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$\left((1-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+\right.$$

$$(7-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)-$$

$$\Bigg(21\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4\Bigg)\Bigg/$$

$$\Bigg(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((-1+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(-7+2n)\,\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)\Bigg)+$$

$$\frac{2}{15}\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]\left(1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^{-\frac{7}{2}+n}\left(\frac{1}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\right)^{-\frac{1}{2}+n}$$

$$\Bigg(\Bigg(45\,(A+B+C)\left(-\frac{1}{3}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+$$

$$\frac{1}{3}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)\Bigg)\Bigg/$$

$$\Bigg(3\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((1-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(7-2n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(50\,(A-C)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\Bigg)\Bigg/$$

$$\Bigg(5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$\Bigg((1-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]+$$

$$(7-2n)\,\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\Bigg)+$$

$$\Bigg(50\,(A-C)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]+\frac{3}{5}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg/\Bigg(5\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Bigg((1-2 n)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(7-2 n)\,\text{AppellF1}\Big[\frac{5}{2},$$

$$\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)-$$

$$\Bigg(42\,(A-B+C)\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]^3\Bigg)\Bigg/$$

$$\Bigg(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Bigg((-1+2 n)\,\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(-7+2 n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{9}{2}-n,$$

$$-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Bigg)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)-\Bigg(21\,(A-B+C)\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4$$

$$\Bigg(-\frac{5}{7}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$\frac{5}{7}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg/$$

$$\Bigg(-7\,\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+\Bigg((-1+2 n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]+(-7+2 n)\,\text{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)-\Bigg(45\,(A+B+C)\,\text{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\Bigg(\Bigg((1-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(7-2 n)\,\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$3\Bigg(-\frac{1}{3}\left(-\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$\frac{1}{3}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{3}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg((1-2 n)\left(-\frac{3}{5}\left(\frac{1}{2}+n\right)\text{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{3}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right.$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{7}{2}-n\right)\text{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,\frac{1}{2}+n,\frac{7}{2},\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+(7-2 n)\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right.$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{3}{5}\left(\frac{9}{2}-n\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{11}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\left.\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/\Bigg(3\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{3}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Bigg((1-2 n)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(7-2 n)\,\mathrm{AppellF1}\Big[\frac{3}{2},$$

$$\frac{9}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Bigg)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)^2-$$

$$\Bigg(50(A-C)\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\Bigg(\Bigg((1-2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$(7-2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\Bigg)\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+$$

$$5\left(-\frac{3}{5}\left(-\frac{1}{2}+n\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$\left.\frac{3}{5}\left(\frac{7}{2}-n\right)\mathrm{AppellF1}\left[\frac{5}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg((1-2 n)\left(-\frac{5}{7}\left(\frac{1}{2}+n\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{7}{2}-n,\frac{3}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right.$$

$$\left.\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{5}{7}\left(\frac{7}{2}-n\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,\frac{1}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right.$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)+(7-2 n)\left(-\frac{5}{7}\left(-\frac{1}{2}+n\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{9}{2}-n,\frac{1}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\right.$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]+\frac{5}{7}\left(\frac{9}{2}-n\right)\mathrm{AppellF1}\left[\frac{7}{2},\frac{11}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]$$

$$\left.\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/\Bigg(5\,\mathrm{AppellF1}\left[\frac{3}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{5}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+$$

$$\Bigg((1-2 n)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]+(7-2 n)\,\mathrm{AppellF1}\Big[\frac{5}{2},$$

$$\frac{9}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Big]\Bigg)\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\Bigg)^2+$$

$$\Bigg(21(A-B+C)\,\mathrm{AppellF1}\left[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2,-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right]\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^4$$

$$\Bigg(\Bigg(\Big((-1+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$(-7+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\Big)\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]-$$

$$7\left(-\frac{5}{7}\left(-\frac{1}{2}+n\right)\text{AppellF1}\Big[\frac{7}{2},\frac{7}{2}-n,\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+\right.$$

$$\left.\frac{5}{7}\left(\frac{7}{2}-n\right)\text{AppellF1}\Big[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\right)+$$

$$\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\left((-1+2n)\left(-\frac{7}{9}\left(\frac{1}{2}+n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{7}{2}-n,\frac{3}{2}+n,\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\right.\right.$$

$$\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+\frac{7}{9}\left(\frac{7}{2}-n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{9}{2}-n,\frac{1}{2}+n,\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]$$

$$\left.\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\right)+(-7+2n)\left(-\frac{7}{9}\left(-\frac{1}{2}+n\right)\text{AppellF1}\Big[\frac{9}{2},\frac{9}{2}-n,\frac{1}{2}+n,\right.$$

$$\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]+\frac{7}{9}\left(\frac{9}{2}-n\right)$$

$$\left.\left.\text{AppellF1}\Big[\frac{9}{2},\frac{11}{2}-n,-\frac{1}{2}+n,\frac{11}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\right)\right)\Bigg)\Bigg)\Bigg/$$

$$\left(-7\,\text{AppellF1}\Big[\frac{5}{2},\frac{7}{2}-n,-\frac{1}{2}+n,\frac{7}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+\left((-1+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{7}{2}-n,\right.\right.$$

$$\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]+$$

$$\left.\left.(-7+2n)\,\text{AppellF1}\Big[\frac{7}{2},\frac{9}{2}-n,-\frac{1}{2}+n,\frac{9}{2},\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2,-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\Big]\right)\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\right)^2\Bigg)\Bigg)$$

- **Problem 383: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[e+f x])^m\left(A+B\,\text{Cos}[e+f x]+C\,\text{Cos}[e+f x]^2\right)dx$$

Optimal (type 5, 183 leaves, 4 steps):

$$-\frac{(C-B(2+m))\,(a+a\,\text{Cos}[e+f x])^m\,\text{Sin}[e+f x]}{f(1+m)(2+m)}+\frac{C\,(a+a\,\text{Cos}[e+f x])^{1+m}\,\text{Sin}[e+f x]}{a f(2+m)}+$$

$$\frac{1}{f(1+m)(2+m)}2^{\frac{1}{2}+m}\left(B m(2+m)+C\left(1+m+m^2\right)+A\left(2+3m+m^2\right)\right)(1+\text{Cos}[e+f x])^{-\frac{1}{2}-m}$$

$$(a+a\,\text{Cos}[e+f x])^m\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\frac{1}{2}-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x])\Big]\,\text{Sin}[e+f x]$$

Result (type 5, 376 leaves):

$$\frac{1}{f} i\, 4^{-1-m} e^{i f m x} \left(1+e^{i(e+f x)}\right)^{-2 m} \left(e^{-\frac{1}{2} i (e+f x)} \left(1+e^{i(e+f x)}\right)\right)^{2 m} \text{Cos}\left[\frac{1}{2}(e+f x)\right]^{-2 m} (a (1+\text{Cos}[e+f x]))^m$$
$$\left(\frac{C\, e^{-i (2 e+f (2+m) x)} \text{Hypergeometric2F1}\left[-2-m,-2 m,-1-m,-e^{i(e+f x)}\right]}{2+m}+\frac{2 B\, e^{-i (e+f (1+m) x)} \text{Hypergeometric2F1}\left[-1-m,-2 m,-m,-e^{i(e+f x)}\right]}{1+m}+\right.$$
$$\frac{2 B\, e^{i (e-f (-1+m) x)} \text{Hypergeometric2F1}\left[1-m,-2 m,2-m,-e^{i(e+f x)}\right]}{-1+m}+\frac{C\, e^{2 i e-i f (-2+m) x} \text{Hypergeometric2F1}\left[2-m,-2 m,3-m,-e^{i(e+f x)}\right]}{-2+m}+$$
$$\left.\frac{4 A\, e^{-i f m x} \text{Hypergeometric2F1}\left[-2 m,-m,1-m,-e^{i(e+f x)}\right]}{m}+\frac{2 C\, e^{-i f m x} \text{Hypergeometric2F1}\left[-2 m,-m,1-m,-e^{i(e+f x)}\right]}{m}\right)$$

## Problem 384: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+a\,\text{Cos}[c+d x])^{2/3} \left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 144 leaves, 4 steps):

$$\frac{3 (8 B-3 C) (a+a\,\text{Cos}[c+d x])^{2/3} \text{Sin}[c+d x]}{40 d}+\frac{3 C (a+a\,\text{Cos}[c+d x])^{5/3} \text{Sin}[c+d x]}{8 a d}+$$
$$\left((40 A+16 B+19 C) (a+a\,\text{Cos}[c+d x])^{2/3} \text{Hypergeometric2F1}\left[-\frac{1}{6},\frac{1}{2},\frac{3}{2},\frac{1}{2}(1-\text{Cos}[c+d x])\right] \text{Sin}[c+d x]\right) \Big/ \left(10\times 2^{5/6} d (1+\text{Cos}[c+d x])^{7/6}\right)$$

Result (type 5, 137 leaves):

$$\frac{1}{320 d} 3 (a (1+\text{Cos}[c+d x]))^{2/3} \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2$$
$$\left(-2 i (40 A+16 B+19 C) \text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{4}{3},-e^{i(c+d x)}\right] (1+\text{Cos}[c+d x]+i\,\text{Sin}[c+d x])^{2/3}+\right.$$
$$\left.2 (40 A+32 B+28 C+2 (8 B+7 C) \text{Cos}[c+d x]+5 C\,\text{Cos}[2 (c+d x)]) \text{Sin}[c+d x]\right)$$

## Problem 385: Unable to integrate problem.

$$\int (a+a\,\text{Cos}[c+d x])^{1/3} \left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 144 leaves, 4 steps):

$$\frac{3 (7 B-3 C) (a+a\,\text{Cos}[c+d x])^{1/3} \text{Sin}[c+d x]}{28 d}+\frac{3 C (a+a\,\text{Cos}[c+d x])^{4/3} \text{Sin}[c+d x]}{7 a d}+$$
$$\frac{(28 A+7 B+13 C) (a+a\,\text{Cos}[c+d x])^{1/3} \text{Hypergeometric2F1}\left[\frac{1}{6},\frac{1}{2},\frac{3}{2},\frac{1}{2}(1-\text{Cos}[c+d x])\right] \text{Sin}[c+d x]}{14\times 2^{1/6} d (1+\text{Cos}[c+d x])^{5/6}}$$

Result (type 8, 37 leaves):

$$\int (a+a\,\text{Cos}[c+d\,x])^{1/3}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)dx$$

## Problem 386: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{1/3}}\,dx$$

Optimal (type 5, 144 leaves, 4 steps):

$$\frac{3\,(5\,B-3\,C)\,\text{Sin}[c+d\,x]}{10\,d\,(a+a\,\text{Cos}[c+d\,x])^{1/3}}+\frac{3\,C\,(a+a\,\text{Cos}[c+d\,x])^{2/3}\,\text{Sin}[c+d\,x]}{5\,a\,d}+$$
$$\frac{(10\,A-5\,B+7\,C)\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{5}{6},\frac{3}{2},\frac{1}{2}\,(1-\text{Cos}[c+d\,x])\right]\,\text{Sin}[c+d\,x]}{5\times 2^{5/6}\,d\,(1+\text{Cos}[c+d\,x])^{1/6}\,(a+a\,\text{Cos}[c+d\,x])^{1/3}}$$

Result (type 5, 105 leaves):

$$\left(-3\,i\,(10\,A-5\,B+7\,C)\,\text{Hypergeometric2F1}\left[\frac{1}{3},\frac{2}{3},\frac{4}{3},-e^{i\,(c+d\,x)}\right]\,(1+\text{Cos}[c+d\,x]+i\,\text{Sin}[c+d\,x])^{2/3}+3\,(5\,B-C+2\,C\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(10\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{1/3}\right)$$

## Problem 387: Unable to integrate problem.

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

Optimal (type 5, 144 leaves, 4 steps):

$$\frac{3\,(A-B+C)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])^{2/3}}+\frac{3\,C\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Sin}[c+d\,x]}{4\,a\,d}-$$
$$\frac{(4\,A-8\,B+7\,C)\,(a+a\,\text{Cos}[c+d\,x])^{1/3}\,\text{Hypergeometric2F1}\left[\frac{1}{6},\frac{1}{2},\frac{3}{2},\frac{1}{2}\,(1-\text{Cos}[c+d\,x])\right]\,\text{Sin}[c+d\,x]}{2\times 2^{1/6}\,a\,d\,(1+\text{Cos}[c+d\,x])^{5/6}}$$

Result (type 8, 37 leaves):

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{2/3}}\,dx$$

## Problem 388: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^{2/3}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 6, 290 leaves, 8 steps):

$$\frac{3\,C\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/3}\,\mathrm{Sin}[c+d\,x]}{8\,b\,d}+$$
$$\left((a+b)\,(8\,b\,B-3\,a\,C)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2},-\frac{5}{3},\frac{3}{2},\frac{1}{2}\,(1-\mathrm{Cos}[c+d\,x]),\frac{b\,(1-\mathrm{Cos}[c+d\,x])}{a+b}\right]\,(a+b\,\mathrm{Cos}[c+d\,x])^{2/3}\,\mathrm{Sin}[c+d\,x]\right)\Big/$$
$$\left(4\,\sqrt{2}\,b^2\,d\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,\left(\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right)^{2/3}\right)+$$
$$\left(\left(8\,A\,b^2-8\,a\,b\,B+3\,a^2\,C+5\,b^2\,C\right)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2},-\frac{2}{3},\frac{3}{2},\frac{1}{2}\,(1-\mathrm{Cos}[c+d\,x]),\frac{b\,(1-\mathrm{Cos}[c+d\,x])}{a+b}\right]\,(a+b\,\mathrm{Cos}[c+d\,x])^{2/3}\,\mathrm{Sin}[c+d\,x]\right)\Big/$$
$$\left(4\,\sqrt{2}\,b^2\,d\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,\left(\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right)^{2/3}\right)$$

Result (type 6, 1607 leaves) :

$$-\frac{1}{2\,b\,d}3\,a\,A\,\mathrm{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]$$
$$\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^{2/3}\,\mathrm{Csc}[c+d\,x]-\frac{1}{5\,d}$$
$$3\,B\,\mathrm{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]\,\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}$$
$$(a+b\,\mathrm{Cos}[c+d\,x])^{2/3}\,\mathrm{Csc}[c+d\,x]-\frac{1}{80\,b\,d}57\,a\,C\,\mathrm{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]$$
$$\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^{2/3}\,\mathrm{Csc}[c+d\,x]+\frac{1}{d}$$
$$A\,b\,\left(1\Big/\left(2\,b^2\right)3\,a\,\mathrm{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]\,\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\right.$$
$$(a+b\,\mathrm{Cos}[c+d\,x])^{2/3}\,\mathrm{Csc}[c+d\,x]-1\Big/\left(5\,b^2\right)3\,\mathrm{AppellF1}\left[\frac{5}{3},\frac{1}{2},\frac{1}{2},\frac{8}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]$$
$$\left.\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/3}\,\mathrm{Csc}[c+d\,x]\right)+\frac{1}{5\,d}$$

$$2\,a\,B\left(1/\left(2\,b^2\right)3\,a\,\text{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$
$$(a+b\,\text{Cos}[c+d\,x])^{2/3}\,\text{Csc}[c+d\,x]-1/\left(5\,b^2\right)3\,\text{AppellF1}\left[\frac{5}{3},\frac{1}{2},\frac{1}{2},\frac{8}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]$$
$$\left.\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,(a+b\,\text{Cos}[c+d\,x])^{5/3}\,\text{Csc}[c+d\,x]\right)-\frac{1}{20\,b\,d}$$
$$3\,a^2\,C\left(1/\left(2\,b^2\right)3\,a\,\text{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$
$$(a+b\,\text{Cos}[c+d\,x])^{2/3}\,\text{Csc}[c+d\,x]-1/\left(5\,b^2\right)3\,\text{AppellF1}\left[\frac{5}{3},\frac{1}{2},\frac{1}{2},\frac{8}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]$$
$$\left.\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,(a+b\,\text{Cos}[c+d\,x])^{5/3}\,\text{Csc}[c+d\,x]\right)+\frac{1}{8\,d}$$
$$5\,b\,C\left(1/\left(2\,b^2\right)3\,a\,\text{AppellF1}\left[\frac{2}{3},\frac{1}{2},\frac{1}{2},\frac{5}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$
$$(a+b\,\text{Cos}[c+d\,x])^{2/3}\,\text{Csc}[c+d\,x]-1/\left(5\,b^2\right)3\,\text{AppellF1}\left[\frac{5}{3},\frac{1}{2},\frac{1}{2},\frac{8}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}$$
$$\left.\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,(a+b\,\text{Cos}[c+d\,x])^{5/3}\,\text{Csc}[c+d\,x]\right)+\frac{(a+b\,\text{Cos}[c+d\,x])^{2/3}\left(\frac{3\,(4\,b\,B+a\,C)\,\text{Sin}[c+d\,x]}{20\,b}+\frac{3}{16}\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 389: Result more than twice size of optimal antiderivative.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{1/3}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 6, 290 leaves, 8 steps) :

$$\frac{3\,C\,(a+b\,\mathrm{Cos}[c+d\,x])^{4/3}\,\mathrm{Sin}[c+d\,x]}{7\,b\,d}+$$
$$\left(\sqrt{2}\,(a+b)\,(7\,b\,B-3\,a\,C)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2},-\frac{4}{3},\frac{3}{2},\frac{1}{2}\,(1-\mathrm{Cos}[c+d\,x]),\frac{b\,(1-\mathrm{Cos}[c+d\,x])}{a+b}\right]\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Sin}[c+d\,x]\right)\Big/$$
$$\left(7\,b^2\,d\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,\left(\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right)^{1/3}\right)+$$
$$\left(\sqrt{2}\,\left(7\,A\,b^2-7\,a\,b\,B+3\,a^2\,C+4\,b^2\,C\right)\,\mathrm{AppellF1}\left[\frac{1}{2},\frac{1}{2},-\frac{1}{3},\frac{3}{2},\frac{1}{2}\,(1-\mathrm{Cos}[c+d\,x]),\frac{b\,(1-\mathrm{Cos}[c+d\,x])}{a+b}\right]\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Sin}[c+d\,x]\right)\Big/$$
$$\left(7\,b^2\,d\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\,\left(\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}\right)^{1/3}\right)$$

Result (type 6, 1597 leaves) :

$$-\frac{1}{b\,d}3\,a\,A\,\mathrm{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]$$
$$\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Csc}[c+d\,x]-\frac{1}{4\,d}$$
$$3\,B\,\mathrm{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]\,\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}$$
$$(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Csc}[c+d\,x]-\frac{1}{28\,b\,d}39\,a\,C\,\mathrm{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]$$
$$\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Csc}[c+d\,x]+\frac{1}{d}$$
$$A\,b\,\left(1\Big/b^2 3\,a\,\mathrm{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]\,\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\right.$$
$$(a+b\,\mathrm{Cos}[c+d\,x])^{1/3}\,\mathrm{Csc}[c+d\,x]-1\Big/\left(4\,b^2\right)3\,\mathrm{AppellF1}\left[\frac{4}{3},\frac{1}{2},\frac{1}{2},\frac{7}{3},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)\,b},-\frac{a+b\,\mathrm{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)\,b}\right]$$
$$\left.\sqrt{\frac{-b-b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,(a+b\,\mathrm{Cos}[c+d\,x])^{4/3}\,\mathrm{Csc}[c+d\,x]\right)+\frac{1}{4\,d}$$

$$a\,B\left(1\Big/b^2 3\,a\,\text{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$

$$(a+b\,\text{Cos}[c+d\,x])^{1/3}\,\text{Csc}[c+d\,x]-1\Big/\left(4\,b^2\right)3\,\text{AppellF1}\left[\frac{4}{3},\frac{1}{2},\frac{1}{2},\frac{7}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]$$

$$\left.\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,(a+b\,\text{Cos}[c+d\,x])^{4/3}\,\text{Csc}[c+d\,x]\right)-\frac{1}{28\,b\,d}$$

$$3\,a^2\,C\left(1\Big/b^2 3\,a\,\text{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$

$$(a+b\,\text{Cos}[c+d\,x])^{1/3}\,\text{Csc}[c+d\,x]-1\Big/\left(4\,b^2\right)3\,\text{AppellF1}\left[\frac{4}{3},\frac{1}{2},\frac{1}{2},\frac{7}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]$$

$$\left.\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,(a+b\,\text{Cos}[c+d\,x])^{4/3}\,\text{Csc}[c+d\,x]\right)+\frac{1}{7\,d}$$

$$4\,b\,C\left(1\Big/b^2 3\,a\,\text{AppellF1}\left[\frac{1}{3},\frac{1}{2},\frac{1}{2},\frac{4}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$

$$(a+b\,\text{Cos}[c+d\,x])^{1/3}\,\text{Csc}[c+d\,x]-1\Big/\left(4\,b^2\right)3\,\text{AppellF1}\left[\frac{4}{3},\frac{1}{2},\frac{1}{2},\frac{7}{3},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(1-\frac{a}{b}\right)b},-\frac{a+b\,\text{Cos}[c+d\,x]}{\left(-1-\frac{a}{b}\right)b}\right]\sqrt{\frac{-b-b\,\text{Cos}[c+d\,x]}{a-b}}$$

$$\left.\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,(a+b\,\text{Cos}[c+d\,x])^{4/3}\,\text{Csc}[c+d\,x]\right)+\frac{(a+b\,\text{Cos}[c+d\,x])^{1/3}\left(\frac{3\,(7\,b\,B+a\,C)\,\text{Sin}[c+d\,x]}{28\,b}+\frac{3}{14}\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 392: Unable to integrate problem.**

$$\int(a+b\,\text{Cos}[e+f\,x])^m\left(A+(A+C)\,\text{Cos}[e+f\,x]+C\,\text{Cos}[e+f\,x]^2\right)dx$$

Optimal (type 6, 215 leaves, 7 steps) :

$$\frac{1}{f\sqrt{1+\text{Cos}[e+f x]}}4\sqrt{2}\,C\,\text{AppellF1}\left[\frac{1}{2},-\frac{3}{2},-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x]),\frac{b(1-\text{Cos}[e+f x])}{a+b}\right](a+b\,\text{Cos}[e+f x])^m\left(\frac{a+b\,\text{Cos}[e+f x]}{a+b}\right)^{-m}\text{Sin}[e+f x]+\frac{1}{f\sqrt{1+\text{Cos}[e+f x]}}2\sqrt{2}(A-C)\,\text{AppellF1}\left[\frac{1}{2},-\frac{1}{2},-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x]),\frac{b(1-\text{Cos}[e+f x])}{a+b}\right](a+b\,\text{Cos}[e+f x])^m\left(\frac{a+b\,\text{Cos}[e+f x]}{a+b}\right)^{-m}\text{Sin}[e+f x]$$

Result (type 8, 37 leaves) :

$$\int(a+b\,\text{Cos}[e+f x])^m\left(A+(A+C)\,\text{Cos}[e+f x]+C\,\text{Cos}[e+f x]^2\right)dx$$

## Problem 393: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\text{Cos}[e+f x])^m\left(A+B\,\text{Cos}[e+f x]+C\,\text{Cos}[e+f x]^2\right)dx$$

Optimal (type 6, 303 leaves, 8 steps) :

$$\frac{C(a+b\,\text{Cos}[e+f x])^{1+m}\,\text{Sin}[e+f x]}{b f(2+m)}-\left(\sqrt{2}(a+b)(a C-b B(2+m))\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2},-1-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x]),\frac{b(1-\text{Cos}[e+f x])}{a+b}\right](a+b\,\text{Cos}[e+f x])^m\left(\frac{a+b\,\text{Cos}[e+f x]}{a+b}\right)^{-m}\text{Sin}[e+f x]\right)\Big/\left(b^2 f(2+m)\sqrt{1+\text{Cos}[e+f x]}\right)+\left(\sqrt{2}\left(a^2 C+b^2 C(1+m)+A b^2(2+m)-a b B(2+m)\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2},-m,\frac{3}{2},\frac{1}{2}(1-\text{Cos}[e+f x]),\frac{b(1-\text{Cos}[e+f x])}{a+b}\right](a+b\,\text{Cos}[e+f x])^m\left(\frac{a+b\,\text{Cos}[e+f x]}{a+b}\right)^{-m}\text{Sin}[e+f x]\right)\Big/\left(b^2 f(2+m)\sqrt{1+\text{Cos}[e+f x]}\right)$$

Result (type 6, 16 189 leaves) :

$$\left(6(a+b)\left(A(a+b\,\text{Cos}[e+f x])^m+\frac{1}{2}C(a+b\,\text{Cos}[e+f x])^m+B\,\text{Cos}[e+f x](a+b\,\text{Cos}[e+f x])^m+\frac{1}{2}C(a+b\,\text{Cos}[e+f x])^m\,\text{Cos}[2(e+f x)]\right)\right.$$
$$\text{Tan}\left[\frac{1}{2}(e+f x)\right]\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m$$
$$\left(\left(A\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/\right.\right.$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)-$$

$$\left(B\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)+$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\Big(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Big((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(2+m)\,\text{AppellF1}\Big[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)-$$

$$\Big(4\,C\,\text{AppellF1}\Big[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)\Big)\Big/$$

$$\Big(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Big((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(2+m)\,\text{AppellF1}\Big[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)+$$

$$\Big(4\,C\,\text{AppellF1}\Big[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Big)\Big/$$

$$\Big(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Big((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,3+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-$$

$$(a+b)\,(3+m)\,\text{AppellF1}\Big[\frac{3}{2},\,4+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Big)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)\Big)\Big)\Big/$$

$$\Big(f\,\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)^3\,\Big(\frac{1}{\big(1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2\big)^3}\,6\,(a+b)\,m\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]\,\Big(-\frac{b\,\text{Sec}\big[\frac{1}{2}\,(e+f\,x)\big]^2\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]}{1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}-$$

$$\frac{\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\left(b-b\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2}\Bigg)\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^{-1+m}$$

$$\Bigg(\Bigg(A\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/$$

$$\Bigg(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)-$$

$$\Bigg(B\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/$$

$$\Bigg(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\Bigg(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/$$

$$\Bigg(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) +$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2}, 2+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 2+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 2+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)\,(2+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) -$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2}, 2+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 2+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 2+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)\,(2+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) +$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2}, 3+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 3+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 3+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)\,(3+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 4+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)\Bigg) -$$

$$\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^4}\, 18\,(a+b)\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}\right)^m$$

$$\Bigg(\Bigg(\text{A AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) -$$

$$\Bigg(\text{B AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)\,(1+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) +$$

$$\Bigg(\text{C AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Bigg/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(2+m)\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right)\Bigg/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(2+m)\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\Bigg/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)(3+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)\right)+$$

$$\frac{1}{\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^3}\,3\,(a+b)\,\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\left(a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}\right)^m$$

$$\left(\left(A\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2\right)\right/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)-$$

$$\left(B\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2\right)\right/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)+$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2\right)\right/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\Big/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,3+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,3+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-(a+b)\,(3+m)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,4+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)\Bigg)+$$

$$\frac{1}{\left(1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2\right)^3}\,6\,(a+b)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]\,\left(a+\frac{b-b\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{1+\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}\right)^m$$

$$\Bigg(\Bigg(2\,A\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\text{Sec}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]$$

$$\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)\Bigg)\Big/\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-(a+b)\,(1+m)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)-$$

$$\Bigg(2\,B\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\,\text{Sec}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]$$

$$\Big(1+\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Big)\Bigg)\Big/\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]+$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]-(a+b)\,(1+m)$$

$$\text{AppellF1}\Big[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2,\,-\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(e+f\,x)\big]^2}{a+b}\Big]\Bigg)\,\text{Tan}\Big[\frac{1}{2}\,(e+f\,x)\Big]^2\Bigg)+$$

$$\left(2\,C\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right.$$

$$\left.\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(A\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$\left.\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,1+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(B\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(1+m)\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\right.$$

$$\left.\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)+$$

$$\left(C\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]-\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,\right.$$

$$\left.\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)^2\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)\,(1+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)+$$

$$\left(2\,B\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+fx)\right]^2\text{Tan}\left[\frac{1}{2}(e+fx)\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+fx)\right]^2\right)-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]\right)\Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)+$$

$$\left(2\,B\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\right.\right.\right.$$

$$\left.\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\right.$$

$$\left.\left.\left.(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\left.\left.\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)-$$

$$\left(4\,C\left(1/(3\,(a+b))\,(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\right.\right.\right.$$

$$\left.\frac{1}{2}\,(e+f\,x)\right]-\frac{1}{3}\,(2+m)\,\text{AppellF1}\left[\frac{3}{2},\,3+m,\,-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(e+f\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\right.$$

$$\left.\left.\left.(e+f\,x)\right]\right)\left(1+\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2\right)\right)\Big/\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2},\,2+m,\,-m,\,\frac{3}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]+\right.$$

$$2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},\,2+m,\,1-m,\,\frac{5}{2},\,-\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2,\,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]^2}{a+b}\right]-(a+b)\,(2+m)\right.$$

$$\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) +$$

$$\Bigg(4\,C\,\Bigg(1/(3(a+b))(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 3+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{1}{3}(3+m)\,\text{AppellF1}\left[\frac{3}{2}, 4+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\,\text{Tan}\Big[$$

$$\frac{1}{2}(e+f x)\Big]\Bigg)\Bigg)\Bigg/\Bigg(3(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 3+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] +$$

$$2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 3+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)(3+m)$$

$$\text{AppellF1}\left[\frac{3}{2}, 4+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg) -$$

$$\Bigg(A\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2$$

$$\Bigg(2\,\Bigg((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)(1+m)\,\text{AppellF1}\Big[\frac{3}{2}, 2+m,$$

$$-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\Bigg)\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right] + 3(a+b)\,\Bigg(\frac{1}{3(a+b)}$$

$$(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right] -$$

$$\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg) +$$

$$2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\,\Bigg((a-b)\,m\,\Bigg(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\text{AppellF1}\Big[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(1+m)\,\text{AppellF1}\Big[\frac{5}{2}, 2+m, 1-m, \frac{7}{2},$$

$$-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)-(a+b)(1+m)$$

$$\left(\frac{1}{5(a+b)}3(a-b)\,m\,\mathrm{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\right.$$

$$\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(2+m)\,\mathrm{AppellF1}\left[\frac{5}{2},3+m,-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]$$

$$\left.\left.\left.\left.\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\Big/\left(3(a+b)\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.\right.$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-\right.$$

$$\left.(a+b)(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2+$$

$$\left(B\,\mathrm{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right.$$

$$\left(2\left((a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.\right.$$

$$\left.\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3(a+b)\left(\frac{1}{3(a+b)}(a-b)\,m\,\mathrm{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(1+m)\,\mathrm{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((a-b)\,m\left(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\mathrm{AppellF1}\left[\frac{5}{2},1+m,2-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)-(a+b)(1+m)\left(\frac{1}{5(a+b)}3(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$2+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(2+m)$$

$$\left.\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2},3+m,-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]-$$

$$\left.\left.(a+b)(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2-$$

$$\left(C\,\text{AppellF1}\left[\frac{1}{2},1+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2\right.$$

$$\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]-(a+b)(1+m)\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3(a+b)\left(\frac{1}{3(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},1+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(1+m)\,\text{AppellF1}\left[\frac{3}{2},2+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((a-b)\, m \left(-\frac{1}{5\,(a+b)} 3\,(a-b)\,(1-m)\,\text{AppellF1}\left[\frac{5}{2}, 1+m, 2-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2}, 2+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right) - (a+b)\,(1+m)\left(\frac{1}{5\,(a+b)} 3\,(a-b)\, m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$2+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, \left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(2+m)$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2}, 3+m, -m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right) \Big/$$

$$\left(3\,(a+b)\,\text{AppellF1}\left[\frac{1}{2}, 1+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] + 2\left((a-b)\, m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\frac{3}{2}, 1+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, \left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] -$$

$$\left.\left.(a+b)\,(1+m)\,\text{AppellF1}\left[\frac{3}{2}, 2+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2 -$$

$$\left(2\, B\,\text{AppellF1}\left[\frac{1}{2}, 2+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(1+\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)\right.$$

$$\left(2\left((a-b)\, m\,\text{AppellF1}\left[\frac{3}{2}, 2+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right] - (a+b)\,(2+m)\right.\right.$$

$$\left.\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right) \text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] +$$

$$3\,(a+b)\left(\frac{1}{3\,(a+b)}(a-b)\, m\,\text{AppellF1}\left[\frac{3}{2}, 2+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{1}{3}(2+m)\,\text{AppellF1}\left[\frac{3}{2}, 3+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)+2\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\Bigg((a-b)\,m\Bigg(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\mathrm{AppellF1}\Big[\frac{5}{2},2+m,2-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]$$

$$\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(2+m)\,\mathrm{AppellF1}\Big[\frac{5}{2},3+m,1-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)-(a+b)(2+m)\Bigg(\frac{1}{5(a+b)}3(a-b)\,m\,\mathrm{AppellF1}\Big[\frac{5}{2},$$

$$3+m,1-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(3+m)$$

$$\mathrm{AppellF1}\Big[\frac{5}{2},4+m,-m,\frac{7}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3(a+b)\,\mathrm{AppellF1}\Big[\frac{1}{2},2+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]+2\Bigg((a-b)\,m\,\mathrm{AppellF1}\Big[$$

$$\frac{3}{2},2+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]-$$

$$(a+b)(2+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},3+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\Bigg)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2+$$

$$\Bigg(4\,C\,\mathrm{AppellF1}\Big[\frac{1}{2},2+m,-m,\frac{3}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\left(1+\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)$$

$$\Bigg(2\Bigg((a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},2+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]-(a+b)(2+m)$$

$$\mathrm{AppellF1}\Big[\frac{3}{2},3+m,-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\Bigg)\,\mathrm{Sec}\left[\frac{1}{2}(e+f x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]+$$

$$3(a+b)\Bigg(\frac{1}{3(a+b)}(a-b)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},2+m,1-m,\frac{5}{2},-\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)+2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\left((a-b)\,m\left(-\frac{1}{5(a+b)}3(a-b)(1-m)\,\text{AppellF1}\left[\frac{5}{2},2+m,2-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right.\right.$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},3+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)-(a+b)(2+m)\left(\frac{1}{5(a+b)}3(a-b)\,m\,\text{AppellF1}\left[\frac{5}{2},\right.\right.$$

$$3+m,1-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{3}{5}(3+m)$$

$$\left.\left.\left.\left.\text{AppellF1}\left[\frac{5}{2},4+m,-m,\frac{7}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]\right)\right)\right)\right)\Big/$$

$$\left(3(a+b)\,\text{AppellF1}\left[\frac{1}{2},2+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]+2\left((a-b)\,m\,\text{AppellF1}\left[\right.\right.\right.$$

$$\frac{3}{2},2+m,1-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]-$$

$$\left.\left.(a+b)(2+m)\,\text{AppellF1}\left[\frac{3}{2},3+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\right)^2-$$

$$\left(4\,C\,\text{AppellF1}\left[\frac{1}{2},3+m,-m,\frac{3}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\left(2\left((a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\right.\right.\right.\right.$$

$$\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]-(a+b)(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,-m,\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,\right.$$

$$\left.\left.-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]+3(a+b)\left(\frac{1}{3(a+b)}(a-b)\,m\,\text{AppellF1}\left[\frac{3}{2},3+m,1-m,\right.\right.$$

$$\frac{5}{2},-\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Bigg]\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2 \text{Tan}\left[\frac{1}{2}(e+f x)\right]-\frac{1}{3}(3+m)\,\text{AppellF1}\left[\frac{3}{2},4+m,\right.$$

$$-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg) + 2\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2$$

$$\Bigg((a-b)\,m\,\Bigg(-\frac{1}{5(a+b)}3\,(a-b)\,(1-m)\,\text{AppellF1}\Big[\frac{5}{2}, 3+m, 2-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]$$

$$\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(3+m)\,\text{AppellF1}\Big[\frac{5}{2}, 4+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2,$$

$$-\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg) - (a+b)\,(3+m)\,\Bigg(\frac{1}{5(a+b)}3\,(a-b)\,m\,\text{AppellF1}\Big[\frac{5}{2},$$

$$4+m, 1-m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right] - \frac{3}{5}(4+m)$$

$$\text{AppellF1}\Big[\frac{5}{2}, 5+m, -m, \frac{7}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\,\text{Sec}\left[\frac{1}{2}(e+f x)\right]^2\text{Tan}\left[\frac{1}{2}(e+f x)\right]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,(a+b)\,\text{AppellF1}\Big[\frac{1}{2}, 3+m, -m, \frac{3}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big] + 2\,\Bigg((a-b)\,m\,\text{AppellF1}\Big[$$

$$\frac{3}{2}, 3+m, 1-m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big] -$$

$$(a+b)\,(3+m)\,\text{AppellF1}\Big[\frac{3}{2}, 4+m, -m, \frac{5}{2}, -\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2, -\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2}{a+b}\Big]\Bigg)\,\text{Tan}\left[\frac{1}{2}(e+f x)\right]^2\Bigg)^2\Bigg)\Bigg)\Bigg)$$

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# Test results for the 1541 problems in "4.2.4.2 (a+b cos)^m (c+d cos)^n (A+B cos+C cos^2).m"

- **Problem 5: Result more than twice size of optimal antiderivative.**

$$\int (a + a\,\text{Cos}[c + d\,x])\,\left(A + C\,\text{Cos}[c + d\,x]^2\right)\,\text{Sec}[c + d\,x]^2\,dx$$

Optimal (type 3, 42 leaves, 4 steps):

$$a\,C\,x + \frac{a\,A\,\text{ArcTanh}[\text{Sin}[c + d\,x]]}{d} + \frac{a\,C\,\text{Sin}[c + d\,x]}{d} + \frac{a\,A\,\text{Tan}[c + d\,x]}{d}$$

Result (type 3, 112 leaves):

$$a C x - \frac{a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a C \operatorname{Cos}[d x] \operatorname{Sin}[c]}{d}+\frac{a C \operatorname{Cos}[c] \operatorname{Sin}[d x]}{d}+\frac{a A \operatorname{Tan}[c+d x]}{d}$$

- **Problem 6: Result more than twice size of optimal antiderivative.**

$$\int (a+a \operatorname{Cos}[c+d x]) \left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 58 leaves, 4 steps):

$$a C x+\frac{a (A+2 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{2 d}+\frac{a A \operatorname{Tan}[c+d x]}{d}+\frac{a A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 3, 218 leaves):

$$a C x-\frac{a C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}-$$
$$\frac{a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+\frac{a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+$$
$$\frac{a A}{4 d \left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{a A}{4 d \left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{a A \operatorname{Tan}[c+d x]}{d}$$

- **Problem 8: Result more than twice size of optimal antiderivative.**

$$\int (a+a \operatorname{Cos}[c+d x]) \left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 117 leaves, 7 steps):

$$\frac{a (3 A+4 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{8 d}+\frac{a (2 A+3 C) \operatorname{Tan}[c+d x]}{3 d}+$$
$$\frac{a (3 A+4 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{8 d}+\frac{a A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}+\frac{a A \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{4 d}$$

Result (type 3, 377 leaves):

$$-\frac{3\,a\,A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}-\frac{a\,C\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{2\,d}+\frac{3\,a\,A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{a\,C\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{2\,d}+\frac{a\,A}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{3\,a\,A}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$
$$\frac{a\,C}{4\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{a\,A}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-\frac{3\,a\,A}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-$$
$$\frac{a\,C}{4\,d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{2\,a\,A\,\mathrm{Tan}[c+d\,x]}{3\,d}+\frac{a\,C\,\mathrm{Tan}[c+d\,x]}{d}+\frac{a\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d}$$

## Problem 14: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^2\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 112 leaves, 6 steps):

$$2\,a^2\,C\,x+\frac{a^2\,(3\,A+2\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,d}-\frac{a^2\,(3\,A-2\,C)\,\mathrm{Sin}[c+d\,x]}{2\,d}+$$
$$\frac{A\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)\mathrm{Tan}[c+d\,x]}{d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 293 leaves):

$$\frac{1}{16}\,a^2\,(1+\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^4$$
$$\left(8\,C\,x-\frac{2\,(3\,A+2\,C)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{d}+\frac{2\,(3\,A+2\,C)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{d}+\frac{4\,C\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{d}+\right.$$
$$\frac{4\,C\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}+\frac{A}{d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{8\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}-$$
$$\left.\frac{A}{d\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{8\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)$$

## Problem 15: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^2\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 110 leaves, 6 steps):

$$a^2 C x + \frac{a^2 (A + 2 C) \text{ArcTanh}[\text{Sin}[c + d x]]}{d} + \frac{a^2 (A + C) \text{Tan}[c + d x]}{d} + \frac{A \left(a^2 + a^2 \text{Cos}[c + d x]\right) \text{Sec}[c + d x] \text{Tan}[c + d x]}{3 d} + \frac{A (a + a \text{Cos}[c + d x])^2 \text{Sec}[c + d x]^2 \text{Tan}[c + d x]}{3 d}$$

Result (type 3, 748 leaves) :

$$\frac{1}{4} C x (a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 + \frac{(-A - 2 C) (a + a \text{Cos}[c + d x])^2 \text{Log}\left[\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4}{4 d} +$$
$$\frac{(A + 2 C) (a + a \text{Cos}[c + d x])^2 \text{Log}\left[\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4}{4 d} +$$
$$\frac{A (a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \text{Sin}\left[\frac{d x}{2}\right]}{24 d \left(\text{Cos}\left[\frac{c}{2}\right] - \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^3} + \frac{(a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \left(7 A \text{Cos}\left[\frac{c}{2}\right] - 5 A \text{Sin}\left[\frac{c}{2}\right]\right)}{48 d \left(\text{Cos}\left[\frac{c}{2}\right] - \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^2} +$$
$$\frac{(a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \left(5 A \text{Sin}\left[\frac{d x}{2}\right] + 3 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{12 d \left(\text{Cos}\left[\frac{c}{2}\right] - \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right)} + \frac{A (a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \text{Sin}\left[\frac{d x}{2}\right]}{24 d \left(\text{Cos}\left[\frac{c}{2}\right] + \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^3} +$$
$$\frac{(a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \left(-7 A \text{Cos}\left[\frac{c}{2}\right] - 5 A \text{Sin}\left[\frac{c}{2}\right]\right)}{48 d \left(\text{Cos}\left[\frac{c}{2}\right] + \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^2} + \frac{(a + a \text{Cos}[c + d x])^2 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \left(5 A \text{Sin}\left[\frac{d x}{2}\right] + 3 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{12 d \left(\text{Cos}\left[\frac{c}{2}\right] + \text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \text{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right)}$$

- **Problem 22: Result more than twice size of optimal antiderivative.**

$$\int (a + a \text{Cos}[c + d x])^3 \left(A + C \text{Cos}[c + d x]^2\right) \text{Sec}[c + d x]^2 \, dx$$

Optimal (type 3, 145 leaves, 7 steps) :

$$\frac{1}{2} a^3 (6 A + 5 C) x + \frac{3 a^3 A \text{ArcTanh}[\text{Sin}[c + d x]]}{d} + \frac{5 a^3 C \text{Sin}[c + d x]}{2 d} - \frac{(3 A - C) \left(a^2 + a^2 \text{Cos}[c + d x]\right)^2 \text{Sin}[c + d x]}{3 a d} - \frac{(6 A - 5 C) \left(a^3 + a^3 \text{Cos}[c + d x]\right) \text{Sin}[c + d x]}{6 d} + \frac{A (a + a \text{Cos}[c + d x])^3 \text{Tan}[c + d x]}{d}$$

Result (type 3, 298 leaves) :

$$\frac{1}{96} a^3 (1+\text{Cos}[c+d x])^3 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^6$$
$$\left(6 (6 A+5 C) x-\frac{36 A \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d}+\frac{36 A \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d}+\frac{3 (4 A+15 C) \text{Cos}[d x] \text{Sin}[c]}{d}+\right.$$
$$\frac{9 C \text{Cos}[2 d x] \text{Sin}[2 c]}{d}+\frac{C \text{Cos}[3 d x] \text{Sin}[3 c]}{d}+\frac{3 (4 A+15 C) \text{Cos}[c] \text{Sin}[d x]}{d}+\frac{9 C \text{Cos}[2 c] \text{Sin}[2 d x]}{d}+\frac{C \text{Cos}[3 c] \text{Sin}[3 d x]}{d}+$$
$$\left.\frac{12 A \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+\frac{12 A \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}\right)$$

- **Problem 24: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^3 \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 156 leaves, 7 steps):

$$3 a^3 C x+\frac{a^3 (5 A+6 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}-\frac{5 a^3 A \text{Sin}[c+d x]}{2 d}+\frac{(5 A+3 C) \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Tan}[c+d x]}{3 d}+$$
$$\frac{A \left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a d}+\frac{A (a+a \text{Cos}[c+d x])^3 \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

Result (type 3, 832 leaves):

$$\frac{3}{8} C x (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6+\frac{(-5 A-6 C) (a+a \text{Cos}[c+d x])^3 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{16 d}+$$
$$\frac{(5 A+6 C) (a+a \text{Cos}[c+d x])^3 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{16 d}+$$
$$\frac{C \text{Cos}[d x] (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}[c]}{8 d}+\frac{C \text{Cos}[c] (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}[d x]}{8 d}+$$
$$\frac{A (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}\left[\frac{d x}{2}\right]}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(5 A \text{Cos}\left[\frac{c}{2}\right]-4 A \text{Sin}\left[\frac{c}{2}\right]\right)}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$
$$\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(11 A \text{Sin}\left[\frac{d x}{2}\right]+3 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{24 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+\frac{A (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}\left[\frac{d x}{2}\right]}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$
$$\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(-5 A \text{Cos}\left[\frac{c}{2}\right]-4 A \text{Sin}\left[\frac{c}{2}\right]\right)}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(11 A \text{Sin}\left[\frac{d x}{2}\right]+3 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{24 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

## Problem 33: Result more than twice size of optimal antiderivative.

$$\int (a+a\operatorname{Cos}[c+d x])^4 \left(A+C\operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3\, dx$$

Optimal (type 3, 186 leaves, 8 steps):

$$2 a^4 (2 A+3 C) x+\frac{a^4 (13 A+2 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{2 d}-\frac{5 a^4 (A-2 C) \operatorname{Sin}[c+d x]}{2 d}-\frac{(15 A-2 C) \left(a^2+a^2 \operatorname{Cos}[c+d x]\right)^2 \operatorname{Sin}[c+d x]}{6 d}-\frac{(9 A-4 C) \left(a^4+a^4 \operatorname{Cos}[c+d x]\right) \operatorname{Sin}[c+d x]}{3 d}+\frac{2 a A (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Tan}[c+d x]}{d}+\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 3, 756 leaves):

$$\frac{1}{8} (2 A+3 C) x (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8+\frac{(-13 A-2 C) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d}+$$
$$\frac{(13 A+2 C) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d}+\frac{(4 A+27 C) \operatorname{Cos}[d x] (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[c]}{64 d}+$$
$$\frac{C \operatorname{Cos}[2 d x] (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[2 c]}{16 d}+\frac{C \operatorname{Cos}[3 d x] (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[3 c]}{192 d}+$$
$$\frac{(4 A+27 C) \operatorname{Cos}[c] (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[d x]}{64 d}+\frac{C \operatorname{Cos}[2 c] (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[2 d x]}{16 d}+$$
$$\frac{C \operatorname{Cos}[3 c] (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[3 d x]}{192 d}+\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{64 d \left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$
$$\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d \left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}-\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{64 d \left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}\left[\frac{d x}{2}\right]}{4 d \left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

## Problem 42: Result more than twice size of optimal antiderivative.

$$\int \frac{A+C\operatorname{Cos}[c+d x]^2}{a+a\operatorname{Cos}[c+d x]}\, dx$$

Optimal (type 3, 48 leaves, 3 steps):

$$-\frac{C x}{a}+\frac{C \operatorname{Sin}[c+d x]}{a d}+\frac{(A+C) \operatorname{Sin}[c+d x]}{a d (1+\operatorname{Cos}[c+d x])}$$

Result (type 3, 108 leaves):

$$\frac{1}{4\,a\,d}\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-2\,C\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-2\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+4\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+5\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 43: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 48 leaves, 3 steps):

$$\frac{C\,x}{a}+\frac{A\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a\,d}-\frac{(A+C)\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 114 leaves):

$$\frac{1}{a\,d\,(1+\mathrm{Cos}[c+d\,x])}2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(C\,d\,x-A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)-(A+C)\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)$$

- **Problem 44: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 61 leaves, 5 steps):

$$-\frac{A\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a\,d}+\frac{(2\,A+C)\,\mathrm{Tan}[c+d\,x]}{a\,d}-\frac{(A+C)\,\mathrm{Tan}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 229 leaves):

$$\left(4\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Cos}[c+d\,x]^2\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left((A+C)\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+A\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\mathrm{Sin}[d\,x]\Big/\left(\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\right)\right)\right)\Big/\left(a\,d\,(1+\mathrm{Cos}[c+d\,x])\,(2\,A+C+C\,\mathrm{Cos}[2\,(c+d\,x)])\right)$$

- **Problem 45: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 105 leaves, 6 steps):

$$\frac{(3A+2C)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{2 a d}-\frac{(2A+C)\,\text{Tan}[c+d x]}{a d}+\frac{(3A+2C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{2 a d}-\frac{(A+C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{d\,(a+a\,\text{Cos}[c+d x])}$$

Result (type 3, 284 leaves) :

$$\frac{1}{2 a d\,(1+\text{Cos}[c+d x])}\text{Cos}\left[\frac{1}{2}(c+d x)\right]\Bigg(-4\,(A+C)\,\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$\text{Cos}\left[\frac{1}{2}(c+d x)\right]\Bigg(-2\,(3A+2C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]+6A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]+$$
$$4C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]+\frac{A}{\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{A}{\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-$$
$$(4A\,\text{Sin}[d x])\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Bigg)\Bigg)$$

- **Problem 46: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^4}{a+a\,\text{Cos}[c+d x]}\,dx$$

Optimal (type 3, 133 leaves, 6 steps) :

$$-\frac{(3A+2C)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{2 a d}+\frac{(4A+3C)\,\text{Tan}[c+d x]}{a d}-$$
$$\frac{(3A+2C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{2 a d}-\frac{(A+C)\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{d\,(a+a\,\text{Cos}[c+d x])}+\frac{(4A+3C)\,\text{Tan}[c+d x]^3}{3 a d}$$

Result (type 3, 765 leaves) :

$$\frac{(3A+2C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+dx])}+\frac{(-3A-2C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+dx])}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(A\,\text{Sin}\left[\frac{dx}{2}\right]+C\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{d\,(a+a\,\text{Cos}[c+dx])}+\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sin}\left[\frac{dx}{2}\right]}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(-A\,\text{Cos}\left[\frac{c}{2}\right]+2A\,\text{Sin}\left[\frac{c}{2}\right]\right)}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(5A\,\text{Sin}\left[\frac{dx}{2}\right]+3C\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sin}\left[\frac{dx}{2}\right]}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(A\,\text{Cos}\left[\frac{c}{2}\right]+2A\,\text{Sin}\left[\frac{c}{2}\right]\right)}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(5A\,\text{Sin}\left[\frac{dx}{2}\right]+3C\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

## Problem 47: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+dx]^4\left(A+C\,\text{Cos}[c+dx]^2\right)}{(a+a\,\text{Cos}[c+dx])^2}\,dx$$

Optimal (type 3, 191 leaves, 8 steps):

$$\frac{(28A+55C)\,x}{8a^2}-\frac{8\,(A+2C)\,\text{Sin}[c+dx]}{a^2 d}+\frac{(28A+55C)\,\text{Cos}[c+dx]\,\text{Sin}[c+dx]}{8a^2 d}+\frac{(28A+55C)\,\text{Cos}[c+dx]^3\,\text{Sin}[c+dx]}{12a^2 d}-$$

$$\frac{2\,(A+2C)\,\text{Cos}[c+dx]^4\,\text{Sin}[c+dx]}{a^2 d\,(1+\text{Cos}[c+dx])}-\frac{(A+C)\,\text{Cos}[c+dx]^5\,\text{Sin}[c+dx]}{3d\,(a+a\,\text{Cos}[c+dx])^2}+\frac{8\,(A+2C)\,\text{Sin}[c+dx]^3}{3a^2 d}$$

Result (type 3, 399 leaves):

$$\frac{1}{384\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(72\,(28\,A+55\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+72\,(28\,A+55\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+672\,A\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+1320\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$672\,A\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+1320\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-3048\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-5184\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+1176\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+1344\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-$$
$$1912\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-3488\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-504\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-1312\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-120\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$
$$285\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-120\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-285\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+24\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+57\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+$$
$$\left.24\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+57\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-7\,C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-7\,C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 48: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^3\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 163 leaves, 7 steps) :

$$-\frac{(2\,A+5\,C)\,x}{a^2}+\frac{(5\,A+12\,C)\,\mathrm{Sin}[c+d\,x]}{a^2\,d}-\frac{(2\,A+5\,C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{a^2\,d}-$$
$$\frac{2\,(2\,A+5\,C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A+C)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(5\,A+12\,C)\,\mathrm{Sin}[c+d\,x]^3}{3\,a^2\,d}$$

Result (type 3, 341 leaves) :

$$\frac{1}{48\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(-72\,(2\,A+5\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-72\,(2\,A+5\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]-48\,A\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]-120\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]-\right.$$
$$48\,A\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-120\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+264\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+516\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-120\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-156\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+$$
$$164\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+342\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+36\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+118\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+12\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+30\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$\left.12\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+30\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-3\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-3\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 50: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 90 leaves, 6 steps):

$$-\frac{2\,C\,x}{a^2}+\frac{(A+4\,C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d}+\frac{2\,C\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A+C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 195 leaves):

$$\frac{1}{48\,a^2\,d}\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(-36\,C\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-36\,C\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-12\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-12\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+12\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+66\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]-12\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-\right.$$
$$\left.30\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+8\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+41\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+9\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+3\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+3\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]\right)$$

## Problem 51: Result more than twice size of optimal antiderivative.

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 66 leaves, 3 steps):

$$\frac{C\,x}{a^2}+\frac{(A-5\,C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}+\frac{(A+C)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 141 leaves):

$$\frac{1}{24\,a^2\,d}\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(9\,C\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+9\,C\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+3\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$\left.3\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+6\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-18\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+12\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+2\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-10\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

## Problem 52: Result more than twice size of optimal antiderivative.

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 77 leaves, 4 steps):

$$\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}-\frac{2\,(2\,A-C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 166 leaves):

$$-\frac{1}{3 a^2 d (1+\text{Cos}[c+d x])^2} 2 \text{Cos}\left[\frac{1}{2} (c+d x)\right] \left(6 A \text{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)+ (A+C) \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+4 (2 A-C) \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+(A+C) \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Tan}\left[\frac{c}{2}\right]\right)$$

- **Problem 53: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^2}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 91 leaves, 6 steps):

$$-\frac{2 A \text{ArcTanh}[\text{Sin}[c+d x]]}{a^2 d}+\frac{(10 A+C) \text{Tan}[c+d x]}{3 a^2 d}-\frac{2 A \text{Tan}[c+d x]}{a^2 d (1+\text{Cos}[c+d x])}-\frac{(A+C) \text{Tan}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 288 leaves):

$$\frac{1}{3 a^2 d (1+\text{Cos}[c+d x])^2 (2 A+C+C \text{Cos}[2 (c+d x)])} 4 \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Cos}[c+d x]^2 \left(C+A \text{Sec}[c+d x]^2\right) \left((A+C) \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+2 (7 A+C) \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+6 A \text{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \left(2 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-2 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\text{Sin}[d x] \Big/ \left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)\right)+(A+C) \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Tan}\left[\frac{c}{2}\right]\right)$$

- **Problem 54: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 146 leaves, 7 steps):

$$\frac{(7 A+2 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a^2 d}-\frac{4 (4 A+C) \text{Tan}[c+d x]}{3 a^2 d}+\frac{(7 A+2 C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a^2 d}-\frac{2 (4 A+C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 a^2 d (1+\text{Cos}[c+d x])}-\frac{(A+C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 560 leaves):

$$-\frac{2\,(7A+2C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+dx])^2}+$$

$$\frac{2\,(7A+2C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+dx])^2}+\frac{1}{48\,d\,(a+a\,\mathrm{Cos}[c+dx])^2}\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]$$

$$\mathrm{Sec}[c+dx]^2\left(14\,A\,\mathrm{Sin}\left[\frac{dx}{2}\right]+20\,C\,\mathrm{Sin}\left[\frac{dx}{2}\right]-97\,A\,\mathrm{Sin}\left[\frac{3dx}{2}\right]-22\,C\,\mathrm{Sin}\left[\frac{3dx}{2}\right]+126\,A\,\mathrm{Sin}\left[c-\frac{dx}{2}\right]+36\,C\,\mathrm{Sin}\left[c-\frac{dx}{2}\right]-\right.$$

$$42\,A\,\mathrm{Sin}\left[c+\frac{dx}{2}\right]-36\,C\,\mathrm{Sin}\left[c+\frac{dx}{2}\right]+98\,A\,\mathrm{Sin}\left[2c+\frac{dx}{2}\right]+20\,C\,\mathrm{Sin}\left[2c+\frac{dx}{2}\right]+3\,A\,\mathrm{Sin}\left[c+\frac{3dx}{2}\right]+18\,C\,\mathrm{Sin}\left[c+\frac{3dx}{2}\right]-$$

$$37\,A\,\mathrm{Sin}\left[2c+\frac{3dx}{2}\right]-22\,C\,\mathrm{Sin}\left[2c+\frac{3dx}{2}\right]+63\,A\,\mathrm{Sin}\left[3c+\frac{3dx}{2}\right]+18\,C\,\mathrm{Sin}\left[3c+\frac{3dx}{2}\right]-75\,A\,\mathrm{Sin}\left[c+\frac{5dx}{2}\right]-18\,C\,\mathrm{Sin}\left[c+\frac{5dx}{2}\right]-$$

$$15\,A\,\mathrm{Sin}\left[2c+\frac{5dx}{2}\right]+6\,C\,\mathrm{Sin}\left[2c+\frac{5dx}{2}\right]-39\,A\,\mathrm{Sin}\left[3c+\frac{5dx}{2}\right]-18\,C\,\mathrm{Sin}\left[3c+\frac{5dx}{2}\right]+21\,A\,\mathrm{Sin}\left[4c+\frac{5dx}{2}\right]+$$

$$\left.6\,C\,\mathrm{Sin}\left[4c+\frac{5dx}{2}\right]-32\,A\,\mathrm{Sin}\left[2c+\frac{7dx}{2}\right]-8\,C\,\mathrm{Sin}\left[2c+\frac{7dx}{2}\right]-12\,A\,\mathrm{Sin}\left[3c+\frac{7dx}{2}\right]-20\,A\,\mathrm{Sin}\left[4c+\frac{7dx}{2}\right]-8\,C\,\mathrm{Sin}\left[4c+\frac{7dx}{2}\right]\right)$$

- **Problem 55: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+dx]^2\right)\,\mathrm{Sec}[c+dx]^4}{(a+a\,\mathrm{Cos}[c+dx])^2}\,dx$$

Optimal (type 3, 172 leaves, 7 steps):

$$-\frac{(5A+2C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+dx]]}{a^2\,d}+\frac{(12A+5C)\,\mathrm{Tan}[c+dx]}{a^2\,d}-\frac{(5A+2C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{a^2\,d}-$$

$$\frac{2\,(5A+2C)\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+dx])}-\frac{(A+C)\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{3\,d\,(a+a\,\mathrm{Cos}[c+dx])^2}+\frac{(12A+5C)\,\mathrm{Tan}[c+dx]^3}{3\,a^2\,d}$$

Result (type 3, 672 leaves):

$$\frac{4\,(5\,A+2\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}-$$

$$\frac{4\,(5\,A+2\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{48\,d\,(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3$$

$$\left(-3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-24\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+155\,A\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+66\,C\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-153\,A\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-60\,C\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+21\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+\right.$$

$$24\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-135\,A\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-60\,C\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+25\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-4\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+45\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$

$$36\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-85\,A\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-34\,C\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+99\,A\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+42\,C\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+21\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$

$$33\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+24\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-45\,A\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-18\,C\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+57\,A\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+24\,C\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+$$

$$18\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+24\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-15\,A\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-6\,C\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+$$

$$\left.24\,A\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+10\,C\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+11\,A\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+3\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+13\,A\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+7\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 56: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^4\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 216 leaves, 8 steps):

$$-\frac{(6\,A+23\,C)\,x}{2\,a^3}+\frac{4\,(9\,A+34\,C)\,\text{Sin}[c+d\,x]}{5\,a^3\,d}-\frac{(6\,A+23\,C)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a^3\,d}-\frac{(A+C)\,\text{Cos}[c+d\,x]^5\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-$$

$$\frac{(3\,A+13\,C)\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(6\,A+23\,C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{3\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}-\frac{4\,(9\,A+34\,C)\,\text{Sin}[c+d\,x]^3}{15\,a^3\,d}$$

Result (type 3, 463 leaves):

$$-\frac{1}{480\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(600\,(6\,A+23\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+600\,(6\,A+23\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+1800\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+6900\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+1800\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+6900\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+360\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+1380\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+360\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+1380\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-7020\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-20\,410\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+4500\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+11\,110\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-4860\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-15\,380\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+900\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+380\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-1452\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-4777\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-300\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-1625\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-60\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-230\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-60\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-230\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+20\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+20\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-5\,C\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]-5\,C\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 57: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^3\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 189 leaves, 4 steps):

$$\frac{(2\,A+13\,C)\,x}{2\,a^3}-\frac{2\,(11\,A+76\,C)\,\text{Sin}[c+d\,x]}{15\,a^3\,d}+\frac{(2\,A+13\,C)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a^3\,d}-\frac{(A+C)\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(A+11\,C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(11\,A+76\,C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{15\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 393 leaves):

$$\frac{1}{480\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(600\,(2\,A+13\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+600\,(2\,A+13\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+600\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+3900\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+600\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+3900\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+120\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+780\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+120\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+780\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-2960\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-12\,760\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+2160\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+7560\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-1840\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9230\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+720\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+930\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-512\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2782\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-750\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-105\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-105\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

### Problem 58: Result more than twice size of optimal antiderivative.

$$\int \frac{\cos[c+d x]^2 \left(A+C \cos[c+d x]^2\right)}{(a+a \cos[c+d x])^3} \, dx$$

Optimal (type 3, 136 leaves, 7 steps):

$$-\frac{3 C x}{a^3}+\frac{(2 A+27 C) \sin[c+d x]}{15 a^3 d}-\frac{(A+C) \cos[c+d x]^3 \sin[c+d x]}{5 d (a+a \cos[c+d x])^3}+\frac{(A-9 C) \cos[c+d x]^2 \sin[c+d x]}{15 a d (a+a \cos[c+d x])^2}+\frac{3 C \sin[c+d x]}{d \left(a^3+a^3 \cos[c+d x]\right)}$$

Result (type 3, 283 leaves):

$$-\frac{1}{960 a^3 d} \sec\left[\frac{c}{2}\right] \sec\left[\frac{1}{2} (c+d x)\right]^5 \left(900 C d x \cos\left[\frac{d x}{2}\right]+900 C d x \cos\left[c+\frac{d x}{2}\right]+450 C d x \cos\left[c+\frac{3 d x}{2}\right]+450 C d x \cos\left[2 c+\frac{3 d x}{2}\right]+90 C d x \cos\left[2 c+\frac{5 d x}{2}\right]+90 C d x \cos\left[3 c+\frac{5 d x}{2}\right]-160 A \sin\left[\frac{d x}{2}\right]-1755 C \sin\left[\frac{d x}{2}\right]+120 A \sin\left[c+\frac{d x}{2}\right]+1125 C \sin\left[c+\frac{d x}{2}\right]-80 A \sin\left[c+\frac{3 d x}{2}\right]-1215 C \sin\left[c+\frac{3 d x}{2}\right]+60 A \sin\left[2 c+\frac{3 d x}{2}\right]+225 C \sin\left[2 c+\frac{3 d x}{2}\right]-28 A \sin\left[2 c+\frac{5 d x}{2}\right]-363 C \sin\left[2 c+\frac{5 d x}{2}\right]-75 C \sin\left[3 c+\frac{5 d x}{2}\right]-15 C \sin\left[3 c+\frac{7 d x}{2}\right]-15 C \sin\left[4 c+\frac{7 d x}{2}\right]\right)$$

### Problem 62: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+C \cos[c+d x]^2\right) \sec[c+d x]^2}{(a+a \cos[c+d x])^3} \, dx$$

Optimal (type 3, 129 leaves, 7 steps):

$$-\frac{3 A \operatorname{ArcTanh}[\sin[c+d x]]}{a^3 d}+\frac{2 (36 A+C) \tan[c+d x]}{15 a^3 d}-\frac{(A+C) \tan[c+d x]}{5 d (a+a \cos[c+d x])^3}-\frac{(9 A-C) \tan[c+d x]}{15 a d (a+a \cos[c+d x])^2}-\frac{3 A \tan[c+d x]}{d \left(a^3+a^3 \cos[c+d x]\right)}$$

Result (type 3, 596 leaves):

$$\frac{1}{a^3}\left(\frac{48\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{d\,(1+\mathrm{Cos}[c+d\,x])^3\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}-\right.$$

$$\frac{48\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{d\,(1+\mathrm{Cos}[c+d\,x])^3\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{1}{60\,d\,(1+\mathrm{Cos}[c+d\,x])^3\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)$$

$$\left(-255\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-20\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+567\,A\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+22\,C\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-600\,A\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-10\,C\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]+375\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+\right.$$

$$10\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-480\,A\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]-20\,C\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]-60\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+402\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+22\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$

$$225\,A\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+315\,A\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+10\,C\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+30\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+240\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+10\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-$$

$$\left.\left.45\,A\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+72\,A\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+2\,C\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+15\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+57\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+2\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)\right)$$

- **Problem 63: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 192 leaves, 8 steps):

$$\frac{(13\,A+2\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a^3\,d}-\frac{2\,(76\,A+11\,C)\,\mathrm{Tan}[c+d\,x]}{15\,a^3\,d}+\frac{(13\,A+2\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a^3\,d}-$$

$$\frac{(A+C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}-\frac{(11\,A+C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(76\,A+11\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{15\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 3, 672 leaves):

$$-\frac{4\,(13\,A+2\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{4\,(13\,A+2\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{1}{480\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,\Bigg(1235\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+490\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-3805\,A\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-530\,C\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+4329\,A\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]+$$

$$654\,C\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-1989\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-654\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+3575\,A\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+490\,C\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+475\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+$$

$$350\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-2005\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-530\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+2275\,A\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+350\,C\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-$$

$$2673\,A\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]-378\,C\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]-105\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+150\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-1593\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-$$

$$378\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+975\,A\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+150\,C\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-1325\,A\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-190\,C\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$

$$255\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+30\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-875\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-190\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+195\,A\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+$$

$$30\,C\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-304\,A\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-44\,C\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-90\,A\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-214\,A\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-44\,C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\Bigg)$$

- **Problem 64: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 225 leaves, 8 steps) :

$$-\frac{(23\,A+6\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a^3\,d}+\frac{4\,(34\,A+9\,C)\,\mathrm{Tan}[c+d\,x]}{5\,a^3\,d}-\frac{(23\,A+6\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a^3\,d}-\frac{(A+C)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}-$$

$$\frac{(13\,A+3\,C)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(23\,A+6\,C)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}+\frac{4\,(34\,A+9\,C)\,\mathrm{Tan}[c+d\,x]^3}{15\,a^3\,d}$$

Result (type 3, 798 leaves) :

$$\frac{4\,(23\,A+6\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}-$$

$$\frac{4\,(23\,A+6\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{1}{960\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\left(-2484\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-1764\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+12\,622\,A\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+3372\,C\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]-13\,340\,A\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-\right.$$

$$3480\,C\,\text{Sin}\left[c-\frac{d\,x}{2}\right]+4140\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+2100\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-11\,684\,A\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-3144\,C\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-450\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$

$$960\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+5022\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+2232\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-8050\,A\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-2100\,C\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+$$

$$9230\,A\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+2460\,C\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+630\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-390\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+4230\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$

$$1710\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-4370\,A\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-1140\,C\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+5347\,A\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+1422\,C\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+$$

$$875\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-60\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+2747\,A\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+1032\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-1725\,A\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-$$

$$450\,C\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+2375\,A\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+630\,C\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+655\,A\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+60\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+$$

$$1375\,A\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+480\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-345\,A\,\text{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]-90\,C\,\text{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]+544\,A\,\text{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]+$$

$$\left.144\,C\,\text{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]+200\,A\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+30\,C\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+344\,A\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]+114\,C\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 65: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^4\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 223 leaves, 5 steps):

$$\frac{(2\,A+21\,C)\,x}{2\,a^4}-\frac{32\,(5\,A+54\,C)\,\text{Sin}[c+d\,x]}{105\,a^4\,d}+\frac{(2\,A+21\,C)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a^4\,d}-\frac{(10\,A+129\,C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])^2}-$$

$$\frac{16\,(5\,A+54\,C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A+C)\,\text{Cos}[c+d\,x]^5\,\text{Sin}[c+d\,x]}{7\,d\,(a+a\,\text{Cos}[c+d\,x])^4}-\frac{2\,C\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{5\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

Result (type 3, 513 leaves):

$$\frac{1}{6720\, a^4\, d\, (1+\text{Cos}[c+d\,x])^4}$$

$$\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(14\,700\,(2\,A+21\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+14\,700\,(2\,A+21\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+17\,640\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$185\,220\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+17\,640\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+185\,220\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+5880\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$61\,740\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+5880\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+61\,740\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+840\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+8820\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+$$
$$840\,A\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]+8820\,C\,d\,x\,\text{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]-79\,520\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-539\,490\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+66\,080\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+386\,190\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-$$
$$57\,120\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-422\,478\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+30\,240\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+132\,930\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-22\,400\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$
$$181\,461\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+6720\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3675\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-4160\,A\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-36\,003\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-$$
$$\left.9555\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-945\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-945\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+105\,C\,\text{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+105\,C\,\text{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 66: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d\,x]^3\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 174 leaves, 8 steps):

$$-\frac{4\,C\,x}{a^4}+\frac{2\,(3\,A+122\,C)\,\text{Sin}[c+d\,x]}{105\,a^4\,d}+\frac{(3\,A-88\,C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\text{Cos}[c+d\,x])^2}+$$
$$\frac{4\,C\,\text{Sin}[c+d\,x]}{a^4\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A+C)\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{7\,d\,(a+a\,\text{Cos}[c+d\,x])^4}+\frac{2\,(A-6\,C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{35\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$

Result (type 3, 371 leaves):

$$-\frac{1}{26880\,a^4\,d}\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^7$$
$$\left(29400\,C\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+29400\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+17640\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+17640\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+5880\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+\right.$$
$$5880\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+840\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+840\,C\,d\,x\,\mathrm{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]-2520\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-60830\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+$$
$$2520\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+46130\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-1764\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-46116\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+1260\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$18060\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-588\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-19292\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+420\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+2100\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-$$
$$\left.144\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-3791\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-735\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-105\,C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-105\,C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 67: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^2\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 152 leaves, 6 steps):

$$\frac{C\,x}{a^4}-\frac{(8\,A-55\,C)\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])^2}+\frac{(16\,A-215\,C)\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A+C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{7\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}+\frac{2\,(2\,A-5\,C)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{35\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$

Result (type 3, 315 leaves):

$$\frac{1}{13440\,a^4\,d}\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^7$$
$$\left(3675\,C\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+3675\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+2205\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+2205\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+735\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+\right.$$
$$735\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+105\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+105\,C\,d\,x\,\mathrm{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]+560\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-9940\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-$$
$$350\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+8260\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+336\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-7140\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-210\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+3780\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$\left.182\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2800\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+840\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+26\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-520\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 71: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2}{(a+a\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 161 leaves, 8 steps):

$$-\frac{4 A \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{a^4 d}+\frac{2 (332 A+3 C) \operatorname{Tan}[c+d x]}{105 a^4 d}-\frac{(88 A-3 C) \operatorname{Tan}[c+d x]}{105 a^4 d (1+\operatorname{Cos}[c+d x])^2}-\frac{4 A \operatorname{Tan}[c+d x]}{a^4 d (1+\operatorname{Cos}[c+d x])}-\frac{(A+C) \operatorname{Tan}[c+d x]}{7 d (a+a \operatorname{Cos}[c+d x])^4}-\frac{2 (6 A-C) \operatorname{Tan}[c+d x]}{35 a d (a+a \operatorname{Cos}[c+d x])^3}$$

Result (type 3, 680 leaves):

$$\frac{1}{a^4}\left(\frac{128 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{d (1+\operatorname{Cos}[c+d x])^4 (2 A+C+C \operatorname{Cos}[2 c+2 d x])}-\right.$$
$$\frac{128 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{d (1+\operatorname{Cos}[c+d x])^4 (2 A+C+C \operatorname{Cos}[2 c+2 d x])}+$$
$$\frac{1}{840 d (1+\operatorname{Cos}[c+d x])^4 (2 A+C+C \operatorname{Cos}[2 c+2 d x])} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[c] \left(C+A \operatorname{Sec}[c+d x]^2\right)$$
$$\left(-10780 A \operatorname{Sin}\left[\frac{d x}{2}\right]-210 C \operatorname{Sin}\left[\frac{d x}{2}\right]+18788 A \operatorname{Sin}\left[\frac{3 d x}{2}\right]+252 C \operatorname{Sin}\left[\frac{3 d x}{2}\right]-20524 A \operatorname{Sin}\left[c-\frac{d x}{2}\right]-126 C \operatorname{Sin}\left[c-\frac{d x}{2}\right]+\right.$$
$$14644 A \operatorname{Sin}\left[c+\frac{d x}{2}\right]+126 C \operatorname{Sin}\left[c+\frac{d x}{2}\right]-16660 A \operatorname{Sin}\left[2 c+\frac{d x}{2}\right]-210 C \operatorname{Sin}\left[2 c+\frac{d x}{2}\right]-4690 A \operatorname{Sin}\left[c+\frac{3 d x}{2}\right]+$$
$$14378 A \operatorname{Sin}\left[2 c+\frac{3 d x}{2}\right]+252 C \operatorname{Sin}\left[2 c+\frac{3 d x}{2}\right]-9100 A \operatorname{Sin}\left[3 c+\frac{3 d x}{2}\right]+11668 A \operatorname{Sin}\left[c+\frac{5 d x}{2}\right]+132 C \operatorname{Sin}\left[c+\frac{5 d x}{2}\right]-$$
$$630 A \operatorname{Sin}\left[2 c+\frac{5 d x}{2}\right]+9358 A \operatorname{Sin}\left[3 c+\frac{5 d x}{2}\right]+132 C \operatorname{Sin}\left[3 c+\frac{5 d x}{2}\right]-2940 A \operatorname{Sin}\left[4 c+\frac{5 d x}{2}\right]+4228 A \operatorname{Sin}\left[2 c+\frac{7 d x}{2}\right]+$$
$$42 C \operatorname{Sin}\left[2 c+\frac{7 d x}{2}\right]+315 A \operatorname{Sin}\left[3 c+\frac{7 d x}{2}\right]+3493 A \operatorname{Sin}\left[4 c+\frac{7 d x}{2}\right]+42 C \operatorname{Sin}\left[4 c+\frac{7 d x}{2}\right]-420 A \operatorname{Sin}\left[5 c+\frac{7 d x}{2}\right]+$$
$$\left.\left.664 A \operatorname{Sin}\left[3 c+\frac{9 d x}{2}\right]+6 C \operatorname{Sin}\left[3 c+\frac{9 d x}{2}\right]+105 A \operatorname{Sin}\left[4 c+\frac{9 d x}{2}\right]+559 A \operatorname{Sin}\left[5 c+\frac{9 d x}{2}\right]+6 C \operatorname{Sin}\left[5 c+\frac{9 d x}{2}\right]\right)\right)$$

- **Problem 72: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3}{(a+a \operatorname{Cos}[c+d x])^4} \, dx$$

Optimal (type 3, 224 leaves, 9 steps):

$$\frac{(21 A+2 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{2 a^4 d}-\frac{32 (54 A+5 C) \operatorname{Tan}[c+d x]}{105 a^4 d}+\frac{(21 A+2 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 a^4 d}-\frac{(129 A+10 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{105 a^4 d (1+\operatorname{Cos}[c+d x])^2}-\frac{16 (54 A+5 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{105 a^4 d (1+\operatorname{Cos}[c+d x])}-\frac{(A+C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{7 d (a+a \operatorname{Cos}[c+d x])^4}-\frac{2 A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{5 a d (a+a \operatorname{Cos}[c+d x])^3}$$

Result (type 3, 784 leaves):

$$-\frac{8\,(21\,A+2\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}+$$

$$\frac{8\,(21\,A+2\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}+\frac{1}{6720\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]$$

$$\mathrm{Sec}[c+d\,x]^2\,\Bigg(73\,206\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+14\,140\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-166\,668\,A\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-15\,160\,C\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]+183\,162\,A\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]+$$

$$17\,220\,C\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-100\,842\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-17\,220\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+155\,526\,A\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+14\,140\,C\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+$$

$$37\,380\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+9800\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-101\,148\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-15\,160\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+102\,900\,A\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+$$

$$9800\,C\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-119\,364\,A\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]-10\,920\,C\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+8820\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+4760\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$

$$78\,204\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-10\,920\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+49\,980\,A\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+4760\,C\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-64\,053\,A\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$

$$5890\,C\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-3885\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+1470\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-44\,733\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-5890\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+$$

$$15\,435\,A\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]+1470\,C\,\mathrm{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-21\,987\,A\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-2030\,C\,\mathrm{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-3675\,A\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+$$

$$210\,C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-16\,107\,A\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-2030\,C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+2205\,A\,\mathrm{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]+210\,C\,\mathrm{Sin}\left[6\,c+\frac{9\,d\,x}{2}\right]-$$

$$3456\,A\,\mathrm{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]-320\,C\,\mathrm{Sin}\left[4\,c+\frac{11\,d\,x}{2}\right]-840\,A\,\mathrm{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]-2616\,A\,\mathrm{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]-320\,C\,\mathrm{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\Bigg)\Bigg)$$

- **Problem 78: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 96 leaves, 4 steps):

$$\frac{2\,\sqrt{a}\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a\,C\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,C\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 1487 leaves):

$$-\Bigg(\Bigg(\Bigg(\left(\frac{1}{4}-\frac{i}{4}\right)\,A\,\left(1+e^{i\,c}\right)\,\Bigg(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Bigg)\,x\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\Bigg)\Bigg/$$

$$\left(\left(\left((-1-\mathrm{i})+\sqrt{2}\,e^{\frac{\mathrm{i}\,c}{2}}\right)\left(-1+e^{\mathrm{i}\,c}\right)\left(\mathrm{i}-2\sqrt{2}\,e^{\frac{1}{2}\mathrm{i}\,(c+d\,x)}-4\,\mathrm{i}\,e^{\mathrm{i}\,(c+d\,x)}+2\sqrt{2}\,e^{\frac{3}{2}\mathrm{i}\,(c+d\,x)}+\mathrm{i}\,e^{2\,\mathrm{i}\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{\mathrm{i}\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{\sqrt{2}\,d}-$$

$$\frac{\mathrm{i}\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{\sqrt{2}\,d}-$$

$$\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\sqrt{2}\,d}-$$

$$\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\sqrt{2}\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{d}-$$

$$\frac{2\,\mathrm{i}\,A\,\mathrm{ArcTan}\left[\frac{2\,\mathrm{i}\,\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Cot}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\frac{1}{d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)}$$

$$\sqrt{2}\,A\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,\mathrm{i}\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,\mathrm{i}\,\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{3\,d\,x}{2}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{3\,c}{2}\right]}{3\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{c}{2}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+$$

$$\frac{C\,\text{Cos}\left[\frac{3\,c}{2}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{3\,d}$$

- **Problem 79: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\;\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 94 leaves, 4 steps):

$$\frac{\sqrt{a}\;A\,\text{ArcTanh}\left[\frac{\sqrt{a}\;\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}-\frac{a\,(A-2\,C)\;\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{d}$$

Result (type 3, 1527 leaves):

$$-\left(\left(\left(\left(\frac{1}{8}-\frac{i}{8}\right)A\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\;e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\;e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\;e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\;e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\;e^{2\,i\,(c+d\,x)}+$$
$$\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\;e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\;e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\;e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)x\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\left.\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\;e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\;e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\;e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\;\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,\sqrt{2}\;d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\;\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,\sqrt{2}\;d}-$$

$$\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Log}\left[2-\sqrt{2}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{4\,\sqrt{2}\;d}-$$

$$\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Log}\left[2+\sqrt{2}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\;\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{4\,\sqrt{2}\;d}+$$

$$\frac{2\,C\,\text{Cos}\left[\frac{d\,x}{2}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}-$$

$$\frac{i\,A\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\;\mathrm{Cot}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\,\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(A\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\;\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right.$$

$$\left(\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Bigg/$$

$$\left(\sqrt{2}\,d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{2\,C\,\mathrm{Cos}\left[\frac{c}{2}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d}+$$

$$\frac{A\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-\frac{A\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 80: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 110 leaves, 4 steps):

$$\frac{\sqrt{a}\;(3\,A+8\,C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\;\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a\,A\,\mathrm{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 914 leaves):

$$\frac{i\,(-3A-8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{8\sqrt{2}\,d}+$$

$$\frac{i\,(-3A-8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{8\sqrt{2}\,d}+$$

$$\frac{(3A+8C)\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{8\sqrt{2}\,d}+$$

$$\frac{(-3A-8C)\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}+$$

$$\frac{(-3A-8C)\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}+$$

$$\frac{A\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+\frac{A\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(3\,\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)}{8d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}+$$

$$\frac{A\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}-\frac{A\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(3\,\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)}{8d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 81: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+dx]}\,\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^4\,dx$$

Optimal (type 3, 153 leaves, 5 steps):

$$\frac{\sqrt{a}\,(5A+8C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{8d}+\frac{a\,(5A+8C)\,\text{Tan}[c+dx]}{8d\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{a\,A\,\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{12d\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{A\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{3d}$$

Result (type 3, 1084 leaves):

$$\frac{i\,(-5A-8C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}+$$

$$\frac{i\,(-5A-8C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}+$$

$$\frac{(5A+8C)\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16\sqrt{2}\,d}+$$

$$\frac{(-5A-8C)\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{32\sqrt{2}\,d}+$$

$$\frac{(-5A-8C)\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{32\sqrt{2}\,d}+$$

$$\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{12\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{8\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(5A\,\mathrm{Cos}\left[\frac{c}{2}\right]+8C\,\mathrm{Cos}\left[\frac{c}{2}\right]-3A\,\mathrm{Sin}\left[\frac{c}{2}\right]-8C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{12\,d\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+$$

$$\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Sin}\left[\frac{dx}{2}\right]}{8\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+\frac{\sqrt{a\,(1+\mathrm{Cos}[c+dx])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(-5A\,\mathrm{Cos}\left[\frac{c}{2}\right]-8C\,\mathrm{Cos}\left[\frac{c}{2}\right]-3A\,\mathrm{Sin}\left[\frac{c}{2}\right]-8C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 82: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+dx]}\,\left(A+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]^5\,dx$$

Optimal (type 3, 196 leaves, 6 steps):

$$\frac{\sqrt{a}\,(35A+48C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{64\,d}+\frac{a\,(35A+48C)\,\mathrm{Tan}[c+dx]}{64\,d\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+$$

$$\frac{a\,(35A+48C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{96\,d\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+\frac{a\,A\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{24\,d\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+\frac{A\sqrt{a+a\,\mathrm{Cos}[c+dx]}\,\mathrm{Sec}[c+dx]^3\,\mathrm{Tan}[c+dx]}{4\,d}$$

Result (type 3, 1353 leaves):

$$\frac{\mathrm{i}\,(-35\,A-48\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{128\,\sqrt{2}\,d}+$$

$$\frac{\mathrm{i}\,(-35\,A-48\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{128\,\sqrt{2}\,d}+$$

$$\frac{(35\,A+48\,C)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{128\,\sqrt{2}\,d}+$$

$$\frac{(-35\,A-48\,C)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{256\,\sqrt{2}\,d}+$$

$$\frac{(-35\,A-48\,C)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{256\,\sqrt{2}\,d}+$$

$$\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(7\,\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)}{96\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(11\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(35\,A\,\text{Cos}\left[\frac{c}{2}\right]+48\,C\,\text{Cos}\left[\frac{c}{2}\right]-13\,A\,\text{Sin}\left[\frac{c}{2}\right]-16\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{128\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{A\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(-7\,A\,\text{Cos}\left[\frac{c}{2}\right]-A\,\text{Sin}\left[\frac{c}{2}\right]\right)}{96\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(11\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(-35\,A\,\text{Cos}\left[\frac{c}{2}\right]-48\,C\,\text{Cos}\left[\frac{c}{2}\right]-13\,A\,\text{Sin}\left[\frac{c}{2}\right]-16\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{128\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 86: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 133 leaves, 5 steps):

$$\frac{2 a^{3/2} A \,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{d}+\frac{2 a^2 (5 A+4 C)\,\text{Sin}[c+d x]}{5 d \sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{2 a C \sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{5 d}+\frac{2 C (a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{5 d}$$

Result (type 3, 1617 leaves):

$$-\left(\left(\left(\left(\frac{1}{8}-\frac{i}{8}\right) A \left(1+e^{i c}\right) \left(\sqrt{2}-(1-i) e^{\frac{i c}{2}}+(16-16 i) e^{\frac{3 i c}{2}+i d x}+(20+20 i) \sqrt{2}\, e^{2 i c+\frac{3 i d x}{2}}-(34-34 i) e^{\frac{5 i c}{2}+2 i d x}-(20+20 i) \sqrt{2}\, e^{3 i c+\frac{5 i d x}{2}}+\right.\right.\right.\right.$$
$$(16-16 i) e^{\frac{7 i c}{2}+3 i d x}+(4+4 i) \sqrt{2}\, e^{4 i c+\frac{7 i d x}{2}}-(1-i) e^{\frac{9 i c}{2}+4 i d x}+8 i e^{\frac{1}{2} i (c+d x)}-16 \sqrt{2}\, e^{i (c+d x)}-40 i e^{\frac{3}{2} i (c+d x)}+34 \sqrt{2}\, e^{2 i (c+d x)}+$$
$$\left.\left.40 i e^{\frac{5}{2} i (c+d x)}-16 \sqrt{2}\, e^{3 i (c+d x)}-8 i e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\, e^{4 i (c+d x)}-(4+4 i) \sqrt{2}\, e^{\frac{1}{2} i (2 c+d x)}\right) x \,(a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\right) \Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\, e^{\frac{i c}{2}}\right) \left(-1+e^{i c}\right) \left(i-2 \sqrt{2}\, e^{\frac{1}{2} i (c+d x)}-4 i e^{i (c+d x)}+2 \sqrt{2}\, e^{\frac{3}{2} i (c+d x)}+i e^{2 i (c+d x)}\right)^2\right)\right)-$$

$$\frac{i A \,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 \sqrt{2}\, d}-$$

$$\frac{i A \,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 \sqrt{2}\, d}-$$

$$\frac{A (a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{4 \sqrt{2}\, d}-$$

$$\frac{A (a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{4 \sqrt{2}\, d}+$$

$$\frac{(A+C)\,\text{Cos}\left[\frac{d x}{2}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\text{Sin}\left[\frac{c}{2}\right]}{d}-$$

$$\frac{i A \,\text{ArcTan}\left[\frac{2 i \,\text{Cos}\left[\frac{c}{2}\right]-i \left(-\sqrt{2}+2 \,\text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4 \,\text{Cos}\left[\frac{c}{2}\right]^2+4 \,\text{Sin}\left[\frac{c}{2}\right]^2}}\right] (a (1+\text{Cos}[c+d x]))^{3/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{d \sqrt{-2+4 \,\text{Cos}\left[\frac{c}{2}\right]^2+4 \,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(A\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right.$$

$$\left(\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\,\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Bigg/$$

$$\left(\sqrt{2}\,d\,\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{C\,\mathrm{Cos}\left[\frac{3\,d\,x}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{3\,c}{2}\right]}{4\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{5\,d\,x}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{5\,c}{2}\right]}{20\,d}+$$

$$\frac{(A+C)\,\mathrm{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{4\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{5\,c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{5\,d\,x}{2}\right]}{20\,d}$$

- **Problem 87: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 136 leaves, 5 steps):

$$\frac{3\,a^{3/2}\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}-\frac{a^2\,(3\,A-8\,C)\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}-\frac{a\,(3\,A-2\,C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 1658 leaves):

$$-\left(\left(\left(\left(\frac{3}{16}-\frac{3\,i}{16}\right)\,A\,\left(1+e^{i\,c}\right)\,\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$

$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$

$$40\,i\,e^{\frac{5}{2}i(c+dx)}-16\sqrt{2}\,e^{3i(c+dx)}-8\,i\,e^{\frac{7}{2}i(c+dx)}+\sqrt{2}\,e^{4i(c+dx)}-(4+4\,i)\sqrt{2}\,e^{\frac{1}{2}i(2c+dx)}\Big)\,x\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\Big)\Big/$$

$$\left(\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}i(c+dx)}-4\,i\,e^{i(c+dx)}+2\sqrt{2}\,e^{\frac{3}{2}i(c+dx)}+i\,e^{2i(c+dx)}\right)^2\right)\right)-$$

$$\frac{3\,i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right](a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\sqrt{2}\,d}-$$

$$\frac{3\,i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right](a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\sqrt{2}\,d}-$$

$$\frac{3\,A\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{8\sqrt{2}\,d}-$$

$$\frac{3\,A\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{8\sqrt{2}\,d}+$$

$$\frac{3\,C\,\mathrm{Cos}\left[\frac{d\,x}{2}\right](a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{c}{2}\right]}{2\,d}-$$

$$\frac{3\,i\,A\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right](a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Cot}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(3\,A\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right.$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(2\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{C\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{3\,c}{2}\right]}{6\,d}+$$

$$\frac{3\,C\,\text{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{3\,c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{6\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,d\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 88: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 147 leaves, 5 steps):

$$\frac{a^{3/2}\,(7\,A+8\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{a^2\,(5\,A-8\,C)\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{3\,a\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 1028 leaves):

$$\frac{i\,(-7A-8C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{16\sqrt{2}\,d}+$$

$$\frac{i\,(-7A-8C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{16\sqrt{2}\,d}+$$

$$\frac{(7A+8C)\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{16\sqrt{2}\,d}+$$

$$\frac{(-7A-8C)\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32\sqrt{2}\,d}+$$

$$\frac{(-7A-8C)\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32\sqrt{2}\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{dx}{2}\right]\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Sin}\left[\frac{c}{2}\right]}{d}+\frac{C\,\mathrm{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Sin}\left[\frac{dx}{2}\right]}{d}+$$

$$\frac{A\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Sin}\left[\frac{dx}{2}\right]}{8\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+\frac{A\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\left(7\,\mathrm{Cos}\left[\frac{c}{2}\right]-5\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}+$$

$$\frac{A\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Sin}\left[\frac{dx}{2}\right]}{8\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}-\frac{A\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\left(7\,\mathrm{Cos}\left[\frac{c}{2}\right]+5\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{16\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 89: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+dx])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+dx]^2\right)\,\mathrm{Sec}[c+dx]^4\,dx$$

Optimal (type 3, 155 leaves, 5 steps):

$$\frac{a^{3/2}\,(11A+24C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{8\,d}+\frac{a^2\,(19A+24C)\,\mathrm{Tan}[c+dx]}{24\,d\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+$$

$$\frac{a\,A\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{4\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{3\,d}$$

Result (type 3, 1106 leaves):

$$\frac{i\,(-11A-24C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32\sqrt{2}\,d}+$$

$$\frac{i\,(-11A-24C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32\sqrt{2}\,d}+$$

$$\frac{(11A+24C)\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32\sqrt{2}\,d}+$$

$$\frac{(-11A-24C)\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{64\sqrt{2}\,d}+$$

$$\frac{(-11A-24C)\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{64\sqrt{2}\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{3A\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\text{Sin}\left[\frac{dx}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\left(11A\,\text{Cos}\left[\frac{c}{2}\right]+8C\,\text{Cos}\left[\frac{c}{2}\right]-5A\,\text{Sin}\left[\frac{c}{2}\right]-8C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{24\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{3A\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\text{Sin}\left[\frac{dx}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\left(-11A\,\text{Cos}\left[\frac{c}{2}\right]-8C\,\text{Cos}\left[\frac{c}{2}\right]-5A\,\text{Sin}\left[\frac{c}{2}\right]-8C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 90: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+dx])^{3/2}\,\left(A+C\,\text{Cos}[c+dx]^2\right)\,\text{Sec}[c+dx]^5\,dx$$

Optimal (type 3, 200 leaves, 6 steps):

$$\frac{a^{3/2}\,(75A+112C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{64\,d}+\frac{a^2\,(75A+112C)\,\text{Tan}[c+dx]}{64\,d\,\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{a^2\,(13A+16C)\,\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{32\,d\,\sqrt{a+a\,\text{Cos}[c+dx]}}+$$

$$\frac{a\,A\,\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{8\,d}+\frac{A\,(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sec}[c+dx]^3\,\text{Tan}[c+dx]}{4\,d}$$

Result (type 3, 1379 leaves) :

$$\frac{i\,(-75 A-112 C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\sqrt{2}\,d}+$$

$$\frac{i\,(-75 A-112 C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\sqrt{2}\,d}+$$

$$\frac{(75 A+112 C)\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\sqrt{2}\,d}+$$

$$\frac{(-75 A-112 C)\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{512\sqrt{2}\,d}+$$

$$\frac{(-75 A-112 C)\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{512\sqrt{2}\,d}+$$

$$\frac{A\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d x}{2}\right]}{32\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+\frac{A\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\left(5\,\mathrm{Cos}\left[\frac{c}{2}\right]-3\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\left(19 A\,\mathrm{Sin}\left[\frac{d x}{2}\right]+16 C\,\mathrm{Sin}\left[\frac{d x}{2}\right]\right)}{128\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\left(75 A\,\mathrm{Cos}\left[\frac{c}{2}\right]+112 C\,\mathrm{Cos}\left[\frac{c}{2}\right]-37 A\,\mathrm{Sin}\left[\frac{c}{2}\right]-80 C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{256\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+$$

$$\frac{A\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d x}{2}\right]}{32\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+\frac{(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\left(-5 A\,\mathrm{Cos}\left[\frac{c}{2}\right]-3 A\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\left(19 A\,\mathrm{Sin}\left[\frac{d x}{2}\right]+16 C\,\mathrm{Sin}\left[\frac{d x}{2}\right]\right)}{128\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\,\left(-75 A\,\mathrm{Cos}\left[\frac{c}{2}\right]-112 C\,\mathrm{Cos}\left[\frac{c}{2}\right]-37 A\,\mathrm{Sin}\left[\frac{c}{2}\right]-80 C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{256\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

## Problem 91: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a + a \cos[c + d x])^{3/2} \left(A + C \cos[c + d x]^2\right) \sec[c + d x]^6 \, dx$$

Optimal (type 3, 245 leaves, 7 steps):

$$\frac{a^{3/2} (133 A + 176 C) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right]}{128 d} + \frac{a^2 (133 A + 176 C) \tan[c + d x]}{128 d \sqrt{a + a \cos[c + d x]}} + \frac{a^2 (133 A + 176 C) \sec[c + d x] \tan[c + d x]}{192 d \sqrt{a + a \cos[c + d x]}} + \frac{a^2 (67 A + 80 C) \sec[c + d x]^2 \tan[c + d x]}{240 d \sqrt{a + a \cos[c + d x]}} + \frac{3 a A \sqrt{a + a \cos[c + d x]} \sec[c + d x]^3 \tan[c + d x]}{40 d} + \frac{A (a + a \cos[c + d x])^{3/2} \sec[c + d x]^4 \tan[c + d x]}{5 d}$$

Result (type 3, 1550 leaves):

$$\frac{i (-133 A - 176 C) \operatorname{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \sin\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{512 \sqrt{2} d} +$$

$$\frac{i (-133 A - 176 C) \operatorname{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sin\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \sin\left[\frac{c}{4}+\frac{d x}{4}\right]}{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{512 \sqrt{2} d} +$$

$$\frac{(133 A + 176 C) (a (1 + \cos[c + d x]))^{3/2} \operatorname{Log}\left[\sqrt{2} + 2 \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{512 \sqrt{2} d} +$$

$$\frac{(-133 A - 176 C) (a (1 + \cos[c + d x]))^{3/2} \operatorname{Log}\left[2 - \sqrt{2} \cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sqrt{2} \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{1024 \sqrt{2} d} +$$

$$\frac{(-133 A - 176 C) (a (1 + \cos[c + d x]))^{3/2} \operatorname{Log}\left[2 + \sqrt{2} \cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sqrt{2} \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{1024 \sqrt{2} d} +$$

$$\frac{A (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{80 d \left(\cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^5} + \frac{3 A (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \sin\left[\frac{d x}{2}\right]}{64 d \left(\cos\left[\frac{c}{2}\right] - \sin\left[\frac{c}{2}\right]\right) \left(\cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^4} +$$

$$\frac{(a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \left(29 A \cos\left[\frac{c}{2}\right] + 16 C \cos\left[\frac{c}{2}\right] - 11 A \sin\left[\frac{c}{2}\right] - 16 C \sin\left[\frac{c}{2}\right]\right)}{384 d \left(\cos\left[\frac{c}{2}\right] - \sin\left[\frac{c}{2}\right]\right) \left(\cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^3} +$$

$$\frac{(a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \left(37 A \sin\left[\frac{d x}{2}\right] + 48 C \sin\left[\frac{d x}{2}\right]\right)}{256 d \left(\cos\left[\frac{c}{2}\right] - \sin\left[\frac{c}{2}\right]\right) \left(\cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right)^2} +$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(133\,A\,\mathrm{Cos}\left[\frac{c}{2}\right]+176\,C\,\mathrm{Cos}\left[\frac{c}{2}\right]-59\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-80\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{A\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{80\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^5}+\frac{3\,A\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-29\,A\,\mathrm{Cos}\left[\frac{c}{2}\right]-16\,C\,\mathrm{Cos}\left[\frac{c}{2}\right]-11\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-16\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(37\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+48\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{256\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(-133\,A\,\mathrm{Cos}\left[\frac{c}{2}\right]-176\,C\,\mathrm{Cos}\left[\frac{c}{2}\right]-59\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-80\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 95: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 170 leaves, 6 steps):

$$\frac{2\,a^{5/2}\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^3\,(49\,A+32\,C)\,\mathrm{Sin}[c+d\,x]}{21\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^2\,(7\,A+8\,C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{7\,d}+\frac{2\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{7\,d}$$

Result (type 3, 1748 leaves):

$$-\left(\left(\left(\left(\frac{1}{16}-\frac{i}{16}\right)\,A\,\left(1+e^{i\,c}\right)\,\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\,x\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right)\Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\,\left(-1+e^{i\,c}\right)\,\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$

$$\frac{i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\sqrt{2}\,d}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\sqrt{2}\,d}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\sqrt{2}\,d}+$$

$$\frac{5\,(4\,A+3\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{c}{2}\right]}{16\,d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2\,d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(2\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(4\,A+11\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{3\,c}{2}\right]}{48\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{5\,c}{2}\right]}{16\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{7\,c}{2}\right]}{112\,d}+$$

$$\frac{5\,(4A+3C)\,\mathrm{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{16\,d}+$$

$$\frac{(4A+11C)\,\mathrm{Cos}\left[\frac{3c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{48\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{5c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{5\,d\,x}{2}\right]}{16\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{7c}{2}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Sin}\left[\frac{7\,d\,x}{2}\right]}{112\,d}$$

- **Problem 96: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 173 leaves, 6 steps):

$$\frac{5\,a^{5/2}\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{a^3\,(15A+64C)\,\mathrm{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}-\frac{a^2\,(15A-16C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d}-$$

$$\frac{a\,(5A-2C)\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 1770 leaves):

$$-\Bigg(\Bigg(\Bigg(\left(\frac{5}{32}-\frac{5\,i}{32}\right)A\left(1+e^{i\,c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\times(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\Bigg)\Big/$$
$$\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\Bigg)-$$

$$\frac{5\,i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}-$$

$$\frac{5\,i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}-$$

$$\frac{5\,A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{16\,\sqrt{2}\,d}-$$

$$\frac{5\,A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{16\,\sqrt{2}\,d}+$$

$$\frac{(2\,A+5\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{c}{2}\right]}{4\,d}-$$

$$\frac{5\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(5\,A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\,\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(4\,\sqrt{2}\,d\,\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{5\,C\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{3\,c}{2}\right]}{24\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{5\,c}{2}\right]}{40\,d}+$$

$$\frac{(2\,A+5\,C)\,\text{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+$$

$$\frac{5\,C\,\text{Cos}\left[\frac{3\,c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{24\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{5c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{40\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 97: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 184 leaves, 6 steps):

$$\frac{a^{5/2}\,(19\,A+8\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{a^3\,(27\,A-56\,C)\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{a^2\,(21\,A-8\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,d}+$$

$$\frac{5\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 1134 leaves):

$$\frac{i\,(-19A-8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{32\sqrt{2}\,d}+$$

$$\frac{i\,(-19A-8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{32\sqrt{2}\,d}+$$

$$\frac{(19A+8C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{32\sqrt{2}\,d}+$$

$$\frac{(-19A-8C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}+$$

$$\frac{(-19A-8C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}+$$

$$\frac{5\,C\,\text{Cos}\left[\frac{dx}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\text{Sin}\left[\frac{c}{2}\right]}{4\,d}+\frac{C\,\text{Cos}\left[\frac{3dx}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\text{Sin}\left[\frac{3c}{2}\right]}{12\,d}+$$

$$\frac{5\,C\,\text{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\text{Sin}\left[\frac{dx}{2}\right]}{4\,d}+\frac{C\,\text{Cos}\left[\frac{3c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\text{Sin}\left[\frac{3dx}{2}\right]}{12\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\text{Sin}\left[\frac{dx}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\left(11\,\text{Cos}\left[\frac{c}{2}\right]-9\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\text{Sin}\left[\frac{dx}{2}\right]}{16\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}-\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\,\left(11\,\text{Cos}\left[\frac{c}{2}\right]+9\,\text{Sin}\left[\frac{c}{2}\right]\right)}{32\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 98: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 192 leaves, 6 steps):

$$\frac{5\,a^{5/2}\,(5A+8C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}-\frac{a^3\,(49A-24C)\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,(31A+24C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Tan}[c+d\,x]}{24\,d}+$$

$$\frac{5\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 1206 leaves):

$$-\frac{5\,i\,(5A+8C)\,\text{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{dx}{4}\right]-\sin\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\sin\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\cos\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\cos\left[\frac{c}{4}+\frac{dx}{4}\right]-\sin\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\cos[c+d\,x]))^{5/2}\,\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}-$$

$$\frac{5\,i\,(5A+8C)\,\text{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{dx}{4}\right]+\sin\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\sin\left[\frac{c}{4}+\frac{dx}{4}\right]}{\cos\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\cos\left[\frac{c}{4}+\frac{dx}{4}\right]-\sin\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\,(a\,(1+\cos[c+d\,x]))^{5/2}\,\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}+$$

$$\frac{5\,(5A+8C)\,(a\,(1+\cos[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{64\sqrt{2}\,d}-$$

$$\frac{5\,(5A+8C)\,(a\,(1+\cos[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\cos\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{128\sqrt{2}\,d}-$$

$$\frac{5\,(5A+8C)\,(a\,(1+\cos[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\cos\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{128\sqrt{2}\,d}+$$

$$\frac{C\cos\left[\frac{dx}{2}\right]\,(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sin\left[\frac{c}{2}\right]}{2\,d}+\frac{C\cos\left[\frac{c}{2}\right]\,(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sin\left[\frac{dx}{2}\right]}{2\,d}+$$

$$\frac{A\,(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{48\,d\left(\cos\left[\frac{c}{2}+\frac{dx}{2}\right]-\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{5A\,(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sin\left[\frac{dx}{2}\right]}{32\,d\left(\cos\left[\frac{c}{2}\right]-\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{c}{2}+\frac{dx}{2}\right]-\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\left(25A\cos\left[\frac{c}{2}\right]+8C\cos\left[\frac{c}{2}\right]-15A\sin\left[\frac{c}{2}\right]-8C\sin\left[\frac{c}{2}\right]\right)}{64\,d\left(\cos\left[\frac{c}{2}\right]-\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{c}{2}+\frac{dx}{2}\right]-\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-$$

$$\frac{A\,(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5}{48\,d\left(\cos\left[\frac{c}{2}+\frac{dx}{2}\right]+\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}+\frac{5A\,(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sin\left[\frac{dx}{2}\right]}{32\,d\left(\cos\left[\frac{c}{2}\right]+\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{c}{2}+\frac{dx}{2}\right]+\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\cos[c+d\,x]))^{5/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^5\left(-25A\cos\left[\frac{c}{2}\right]-8C\cos\left[\frac{c}{2}\right]-15A\sin\left[\frac{c}{2}\right]-8C\sin\left[\frac{c}{2}\right]\right)}{64\,d\left(\cos\left[\frac{c}{2}\right]+\sin\left[\frac{c}{2}\right]\right)\left(\cos\left[\frac{c}{2}+\frac{dx}{2}\right]+\sin\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 99: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\cos[c+d\,x])^{5/2}\left(A+C\cos[c+d\,x]^2\right)\sec[c+d\,x]^5\,dx$$

Optimal (type 3, 200 leaves, 6 steps) :

$$\frac{a^{5/2}\,(163\,A+304\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{a^3\,(299\,A+432\,C)\,\text{Tan}[c+d\,x]}{192\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,(17\,A+16\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{32\,d}+$$

$$\frac{5\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{24\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 1379 leaves) :

$$\frac{i\,(-163\,A-304\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{512\,\sqrt{2}\,d}+$$

$$\frac{i\,(-163\,A-304\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{512\,\sqrt{2}\,d}+$$

$$\frac{(163\,A+304\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{512\,\sqrt{2}\,d}+$$

$$\frac{(-163\,A-304\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{(-163\,A-304\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(23\,\text{Cos}\left[\frac{c}{2}\right]-17\,\text{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(43\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{256\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(163\,A\,\text{Cos}\left[\frac{c}{2}\right]+176\,C\,\text{Cos}\left[\frac{c}{2}\right]-77\,A\,\text{Sin}\left[\frac{c}{2}\right]-144\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{64\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(-23\,A\,\text{Cos}\left[\frac{c}{2}\right]-17\,A\,\text{Sin}\left[\frac{c}{2}\right]\right)}{384\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(43\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{256\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(-163\,A\,\text{Cos}\left[\frac{c}{2}\right]-176\,C\,\text{Cos}\left[\frac{c}{2}\right]-77\,A\,\text{Sin}\left[\frac{c}{2}\right]-144\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{512\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 100: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 245 leaves, 7 steps):

$$\frac{a^{5/2}\,(283\,A+400\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{128\,d}+\frac{a^3\,(283\,A+400\,C)\,\text{Tan}[c+d\,x]}{128\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a^3\,(787\,A+1040\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{960\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,(79\,A+80\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{240\,d}+$$
$$\frac{a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{8\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

Result (type 3, 1550 leaves):

$$\frac{i\,(-283\,A-400\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$
$$\frac{i\,(-283\,A-400\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$
$$\frac{(283\,A+400\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,\sqrt{2}\,d}+$$
$$\frac{(-283\,A-400\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2048\,\sqrt{2}\,d}+$$
$$\frac{(-283\,A-400\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2048\,\sqrt{2}\,d}+$$
$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{160\,d\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^5}+\frac{5\,A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{d\,x}{2}\right]}{128\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$
$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(59\,A\,\text{Cos}\left[\frac{c}{2}\right]+16\,C\,\text{Cos}\left[\frac{c}{2}\right]-29\,A\,\text{Sin}\left[\frac{c}{2}\right]-16\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{768\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$
$$\frac{5\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(15\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{512\,d\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{(a (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(283 A \text{Cos}\left[\frac{c}{2}\right]+400 C \text{Cos}\left[\frac{c}{2}\right]-133 A \text{Sin}\left[\frac{c}{2}\right]-240 C \text{Sin}\left[\frac{c}{2}\right]\right)}{1024 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}-$$

$$\frac{A (a (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{160 d \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^5}+\frac{5 A (a (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \text{Sin}\left[\frac{d x}{2}\right]}{128 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^4}+$$

$$\frac{(a (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(-59 A \text{Cos}\left[\frac{c}{2}\right]-16 C \text{Cos}\left[\frac{c}{2}\right]-29 A \text{Sin}\left[\frac{c}{2}\right]-16 C \text{Sin}\left[\frac{c}{2}\right]\right)}{768 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{5 (a (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(15 A \text{Sin}\left[\frac{d x}{2}\right]+16 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{512 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{(a (1+\text{Cos}[c+d x]))^{5/2} \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(-283 A \text{Cos}\left[\frac{c}{2}\right]-400 C \text{Cos}\left[\frac{c}{2}\right]-133 A \text{Sin}\left[\frac{c}{2}\right]-240 C \text{Sin}\left[\frac{c}{2}\right]\right)}{1024 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 101: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^{5/2} \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^7 \, dx$$

Optimal (type 3, 290 leaves, 8 steps):

$$\frac{a^{5/2} (1015 A+1304 C) \text{ArcTanh}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{512 d}+\frac{a^3 (1015 A+1304 C) \text{Tan}[c+d x]}{512 d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{a^3 (1015 A+1304 C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{768 d \sqrt{a+a \text{Cos}[c+d x]}}+$$

$$\frac{a^3 (109 A+136 C) \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{192 d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{a^2 (23 A+24 C) \sqrt{a+a \text{Cos}[c+d x]} \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{96 d}+$$

$$\frac{a A (a+a \text{Cos}[c+d x])^{3/2} \text{Sec}[c+d x]^4 \text{Tan}[c+d x]}{12 d}+\frac{A (a+a \text{Cos}[c+d x])^{5/2} \text{Sec}[c+d x]^5 \text{Tan}[c+d x]}{6 d}$$

Result (type 3, 791 leaves):

$$\frac{i\,(-1015\,A-1304\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4096\,\sqrt{2}\,d}+$$

$$\frac{i\,(-1015\,A-1304\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4096\,\sqrt{2}\,d}+$$

$$\frac{(1015\,A+1304\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4096\,\sqrt{2}\,d}+$$

$$\frac{(-1015\,A-1304\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8192\,\sqrt{2}\,d}+$$

$$\frac{(-1015\,A-1304\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8192\,\sqrt{2}\,d}+$$

$$\frac{1}{196\,608\,d}(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sec}[c+d\,x]^6\,\left(-9450\,A\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-19\,344\,C\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\right.$$
$$36\,898\,A\,\text{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]+32\,848\,C\,\text{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]+5655\,A\,\text{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]-1512\,C\,\text{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]+17\,661\,A\,\text{Sin}\left[\frac{7\,c}{2}+\frac{7\,d\,x}{2}\right]+$$
$$\left.20\,232\,C\,\text{Sin}\left[\frac{7\,c}{2}+\frac{7\,d\,x}{2}\right]+1015\,A\,\text{Sin}\left[\frac{9\,c}{2}+\frac{9\,d\,x}{2}\right]+1304\,C\,\text{Sin}\left[\frac{9\,c}{2}+\frac{9\,d\,x}{2}\right]+3045\,A\,\text{Sin}\left[\frac{11\,c}{2}+\frac{11\,d\,x}{2}\right]+3912\,C\,\text{Sin}\left[\frac{11\,c}{2}+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 106: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 115 leaves, 6 steps):

$$\frac{2\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,C\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 2199 leaves):

$$-\left(\left((1-i)\,A\,\left(1+e^{i\,c}\right)\right.\right.$$
$$\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+\right.$$
$$(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-$$

$$16\sqrt{2}\,e^{3 i (c+d x)} - 8 i\, e^{\frac{7}{2} i (c+d x)} + \sqrt{2}\, e^{4 i (c+d x)} - (4+4 i)\sqrt{2}\, e^{\frac{1}{2} i (2 c+d x)}\Big) \times \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x] \,(\text{C Cos}[c+d x] + \text{A Sec}[c+d x])\Big) \Big/$$

$$\left(\left(\left((-1-i) + \sqrt{2}\, e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i - 2\sqrt{2}\, e^{\frac{1}{2} i (c+d x)} - 4 i\, e^{i (c+d x)} + 2\sqrt{2}\, e^{\frac{3}{2} i (c+d x)} + i\, e^{2 i (c+d x)}\right)^2 \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x])\right)\right) -$$

$$\left(2 i \sqrt{2}\, \text{A ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] - \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right] - \sqrt{2}\, \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] + \sqrt{2}\, \text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] - \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])\right) \Big/$$

$$\left(d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x])\right) +$$

$$\frac{4 (A+C)\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, \text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] - \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])}{d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x])} -$$

$$\frac{4 (A+C)\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, \text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] + \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])}{d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x])} -$$

$$\left(\sqrt{2}\, \text{A Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, \text{Log}\left[2 - \sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] - \sqrt{2}\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])\right) \Big/$$

$$\left(d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x])\right) +$$

$$\frac{8\, \text{C Cos}\left[\frac{d x}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])\, \text{Sin}\left[\frac{c}{2}\right]}{d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x])} +$$

$$\left((1-i)\, \text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] + \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right] - \sqrt{2}\, \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] + \sqrt{2}\, \text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right] - \text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])\right.$$

$$\left.\left((1+i)\, \text{Cos}\left[\frac{c}{4}\right] + \sqrt{2}\, \text{Cos}\left[\frac{c}{4}\right] - (1-i)\, \text{Sin}\left[\frac{c}{4}\right] - i\sqrt{2}\, \text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\, \text{A Cos}\left[\frac{c}{4}\right] + \sqrt{2}\, \text{A Cos}\left[\frac{c}{4}\right] + (1-i)\, \text{A Sin}\left[\frac{c}{4}\right] - i\sqrt{2}\, \text{A Sin}\left[\frac{c}{4}\right]\right)\right) \Big/$$

$$\left(\sqrt{2}\, d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x]) \left(\text{Cos}\left[\frac{c}{2}\right] + \text{Sin}\left[\frac{c}{2}\right]\right)\right) -$$

$$\left(\left(\frac{1}{2}+\frac{i}{2}\right) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Cos}[c+d x]\, \text{Log}\left[2 + \sqrt{2}\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] - \sqrt{2}\, \text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] (\text{C Cos}[c+d x] + \text{A Sec}[c+d x])\right.$$

$$\left.\left((1+i)\, \text{Cos}\left[\frac{c}{4}\right] + \sqrt{2}\, \text{Cos}\left[\frac{c}{4}\right] - (1-i)\, \text{Sin}\left[\frac{c}{4}\right] - i\sqrt{2}\, \text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\, \text{A Cos}\left[\frac{c}{4}\right] + \sqrt{2}\, \text{A Cos}\left[\frac{c}{4}\right] + (1-i)\, \text{A Sin}\left[\frac{c}{4}\right] - i\sqrt{2}\, \text{A Sin}\left[\frac{c}{4}\right]\right)\right) \Big/$$

$$\left(\sqrt{2}\, d \sqrt{a (1+\text{Cos}[c+d x])}\, (2 A + C + \text{C Cos}[2 c+2 d x]) \left(\text{Cos}\left[\frac{c}{2}\right] + \text{Sin}\left[\frac{c}{2}\right]\right)\right) -$$

$$\left(8\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]\,\text{Cot}\left[\frac{c}{2}\right]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}\right)+$$

$$\left(4\,\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{8\,C\,\text{Cos}\left[\frac{c}{2}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}$$

- **Problem 107: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 113 leaves, 6 steps):

$$-\frac{A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{A\,\text{Tan}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1968 leaves):

$$\left(\left(\frac{1}{2}-\frac{i}{2}\right)A\left(1+e^{i\,c}\right)\right.$$

$$\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+\right.$$

$$\left(4+4\,i\right)\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-\left(1-i\right)e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-$$

$$16\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-\left(4+4\,i\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)\Big)\Big/$$

$$\left(\left(\left(-1-i\right)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right.$$

$$\left.\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)\right)+$$

$$\frac{i\sqrt{2}\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)}+$$

$$\frac{i\sqrt{2}\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)}-$$

$$\frac{4\,(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)}+$$

$$\frac{4\,(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)}+$$

$$\frac{4\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Cot}\left[\frac{c}{2}\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\left(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x]\right)\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}-$$

$$\left(2\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Csc}\left[\frac{c}{2}\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)\right.$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Cos}[c+d\,x]^2\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}-$$

$$\frac{2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Cos}[c+d\,x]^2\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 108: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 159 leaves, 7 steps) :

$$\frac{(7\,A+8\,C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{4\,\sqrt{a}\,d}-\frac{\sqrt{2}\,(A+C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{A\,\mathrm{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 1608 leaves) :

$$\frac{4\,(A+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}-$$

$$\frac{4\,(A+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{(7\,A+8\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)}{2\,\sqrt{2}\,d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\left(i\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Cos}[c+d\,x]^2\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\right.$$

$$\left.\left(7\,\sqrt{2}\,A+8\,\sqrt{2}\,C-14\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]-16\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Bigg/\left(4\,d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(i\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)\right.$$

$$\left.\left(7\sqrt{2}\,A+8\sqrt{2}\,C-14\,A\,\text{Sin}\left[\frac{c}{2}\right]-16\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/\left(4\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)\left(7\sqrt{2}\,A+8\sqrt{2}\,C-14\,A\,\text{Sin}\left[\frac{c}{2}\right]-16\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$

$$\left(8\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left(C+A\,\text{Sec}[c+d\,x]^2\right)\left(7\sqrt{2}\,A+8\sqrt{2}\,C-14\,A\,\text{Sin}\left[\frac{c}{2}\right]-16\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$

$$\left(8\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)\text{Sin}\left[\frac{d\,x}{2}\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}-$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)\left(\text{Cos}\left[\frac{c}{2}\right]-3\,\text{Sin}\left[\frac{c}{2}\right]\right)}{2\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)\text{Sin}\left[\frac{d\,x}{2}\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Cos}[c+d\,x]^2\left(C+A\,\text{Sec}[c+d\,x]^2\right)\left(\text{Cos}\left[\frac{c}{2}\right]+3\,\text{Sin}\left[\frac{c}{2}\right]\right)}{2\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 109: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^4}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 200 leaves, 8 steps):

$$-\frac{(9\,A+8\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\sqrt{a}\,d}+\frac{\sqrt{2}\,(A+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+$$

$$\frac{(7\,A+8\,C)\,\text{Tan}[c+d\,x]}{8\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1212 leaves):

$$\frac{i\,(9A+8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]}{8\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+dx])}}+$$

$$\frac{i\,(9A+8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]}{8\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+dx])}}-\frac{2\,(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+dx])}}+$$

$$\frac{2\,(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+dx])}}+\frac{(-9A-8C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{8\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+dx])}}+$$

$$\frac{(9A+8C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{16\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+dx])}}+\frac{(9A+8C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{16\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+dx])}}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]}{6\,d\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}-\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4\,d\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(7A\,\text{Cos}\left[\frac{c}{2}\right]+8C\,\text{Cos}\left[\frac{c}{2}\right]-9A\,\text{Sin}\left[\frac{c}{2}\right]-8C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{8\,d\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]}{6\,d\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^3}-$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4\,d\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(-7A\,\text{Cos}\left[\frac{c}{2}\right]-8C\,\text{Cos}\left[\frac{c}{2}\right]-9A\,\text{Sin}\left[\frac{c}{2}\right]-8C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{8\,d\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 110: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^5}{\sqrt{a+a\,\text{Cos}[c+dx]}}\,dx$$

Optimal (type 3, 243 leaves, 9 steps):

$$\frac{(107A+112C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{64\sqrt{a}\,d}-\frac{\sqrt{2}\,(A+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}-\frac{(21A+16C)\,\text{Tan}[c+dx]}{64\,d\sqrt{a+a\,\text{Cos}[c+dx]}}+$$

$$\frac{(43A+48C)\,\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{96\,d\sqrt{a+a\,\text{Cos}[c+dx]}}-\frac{A\,\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{24\,d\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{A\,\text{Sec}[c+dx]^3\,\text{Tan}[c+dx]}{4\,d\sqrt{a+a\,\text{Cos}[c+dx]}}$$

Result (type 3, 1479 leaves):

$$\frac{i\,(-107\,A-112\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{64\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+\frac{i\,(-107\,A-112\,C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{64\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{2\,(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}-\frac{2\,(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{(107\,A+112\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{64\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+\frac{(-107\,A-112\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{128\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{(-107\,A-112\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{128\sqrt{2}\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(-A\,\text{Cos}\left[\frac{c}{2}\right]+7\,A\,\text{Sin}\left[\frac{c}{2}\right]\right)}{48\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(19\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{32\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(-21\,A\,\text{Cos}\left[\frac{c}{2}\right]-16\,C\,\text{Cos}\left[\frac{c}{2}\right]+59\,A\,\text{Sin}\left[\frac{c}{2}\right]+48\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^4}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+7\,\text{Sin}\left[\frac{c}{2}\right]\right)}{48\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^3}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(19\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+16\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{32\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(21\,A\,\text{Cos}\left[\frac{c}{2}\right]+16\,C\,\text{Cos}\left[\frac{c}{2}\right]+59\,A\,\text{Sin}\left[\frac{c}{2}\right]+48\,C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{64\,d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

## Problem 111: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]^3 \left(A+C \text{Cos}[c+d x]^2\right)}{(a+a \text{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 3, 259 leaves, 8 steps):

$$\frac{(11 A+19 C) \text{ArcTanh}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}-\frac{(A+C) \text{Cos}[c+d x]^4 \text{Sin}[c+d x]}{2 d (a+a \text{Cos}[c+d x])^{3/2}}-\frac{(455 A+799 C) \text{Sin}[c+d x]}{105 a d \sqrt{a+a \text{Cos}[c+d x]}}-$$
$$\frac{(35 A+67 C) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{70 a d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{(7 A+11 C) \text{Cos}[c+d x]^3 \text{Sin}[c+d x]}{14 a d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{(245 A+397 C) \sqrt{a+a \text{Cos}[c+d x]} \text{Sin}[c+d x]}{210 a^2 d}$$

Result (type 3, 701 leaves):

$$\frac{(-11 A-19 C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d (a (1+\text{Cos}[c+d x]))^{3/2}}+\frac{(11 A+19 C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]}{d (a (1+\text{Cos}[c+d x]))^{3/2}}-$$
$$\frac{(12 A+25 C) \text{Cos}\left[\frac{d x}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{c}{2}\right]}{d (a (1+\text{Cos}[c+d x]))^{3/2}}+\frac{(4 A+11 C) \text{Cos}\left[\frac{3 d x}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{3 c}{2}\right]}{3 d (a (1+\text{Cos}[c+d x]))^{3/2}}-$$
$$\frac{3 C \text{Cos}\left[\frac{5 d x}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{5 c}{2}\right]}{5 d (a (1+\text{Cos}[c+d x]))^{3/2}}+\frac{C \text{Cos}\left[\frac{7 d x}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{7 c}{2}\right]}{7 d (a (1+\text{Cos}[c+d x]))^{3/2}}-\frac{(12 A+25 C) \text{Cos}\left[\frac{c}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{d x}{2}\right]}{d (a (1+\text{Cos}[c+d x]))^{3/2}}+$$
$$\frac{(4 A+11 C) \text{Cos}\left[\frac{3 c}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{3 d x}{2}\right]}{3 d (a (1+\text{Cos}[c+d x]))^{3/2}}-\frac{3 C \text{Cos}\left[\frac{5 c}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{5 d x}{2}\right]}{5 d (a (1+\text{Cos}[c+d x]))^{3/2}}+\frac{C \text{Cos}\left[\frac{7 c}{2}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Sin}\left[\frac{7 d x}{2}\right]}{7 d (a (1+\text{Cos}[c+d x]))^{3/2}}+$$
$$\frac{(-A-C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\text{Cos}[c+d x]))^{3/2} \left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+\frac{(A+C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d (a (1+\text{Cos}[c+d x]))^{3/2} \left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}$$

## Problem 115: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{(a+a \text{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 3, 125 leaves, 6 steps):

$$\frac{2 A \text{ArcTanh}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{a^{3/2} d}-\frac{(5 A-3 C) \text{ArcTanh}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}-\frac{(A+C) \text{Sin}[c+d x]}{2 d (a+a \text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 2265 leaves):

$$-\left(\left((2-2 i) A \left(1+e^{i c}\right)\right.\right.$$

$$\Big(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16 i)\,e^{\frac{3 i c}{2}+i d x}+(20+20 i)\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34 i)\,e^{\frac{5 i c}{2}+2 i d x}-(20+20 i)\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+(16-16 i)\,e^{\frac{7 i c}{2}+3 i d x}+$$
$$(4+4 i)\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8 i\,e^{\frac{1}{2} i (c+d x)}-16\sqrt{2}\,e^{i (c+d x)}-40 i\,e^{\frac{3}{2} i (c+d x)}+34\sqrt{2}\,e^{2 i (c+d x)}+40 i\,e^{\frac{5}{2} i (c+d x)}-$$
$$16\sqrt{2}\,e^{3 i (c+d x)}-8 i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4 i)\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\Big)\,x \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\,(C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])\Big)\Big/$$
$$\Big(\Big(\Big((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\Big)\left(-1+e^{i c}\right)\Big(i-2\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4 i\,e^{i (c+d x)}+2\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\Big)^2$$
$$(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\Big)\Big)-$$

$$\left(4 i\sqrt{2}\,A \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\,(C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])\right)\Big/$$
$$\left(d\,(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\right)+$$
$$\frac{2\,(5 A-3 C)\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right](C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])}{d\,(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])}-$$
$$\frac{2\,(5 A-3 C)\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right](C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])}{d\,(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])}-$$
$$\left(2\sqrt{2}\,A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\operatorname{Log}\left[2-\sqrt{2}\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right](C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])\right)\Big/$$
$$\left(d\,(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\right)+$$
$$\Bigg((1-i)\sqrt{2}\operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\,(C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])$$
$$\left((1+i)\operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}\right]-(1-i)\operatorname{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A \operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A \operatorname{Cos}\left[\frac{c}{4}\right]+(1-i)\,A \operatorname{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A \operatorname{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Big/$$
$$\left(d\,(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)-$$
$$\left((1+i)\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]\operatorname{Log}\left[2+\sqrt{2}\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right](C \operatorname{Cos}[c+d x]+A \operatorname{Sec}[c+d x])\right.$$
$$\left.\left((1+i)\operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}\right]-(1-i)\operatorname{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A \operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A \operatorname{Cos}\left[\frac{c}{4}\right]+(1-i)\,A \operatorname{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A \operatorname{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/$$
$$\left(\sqrt{2}\,d\,(a\,(1+\operatorname{Cos}[c+d x]))^{3/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(16\, i\, A\, \text{ArcTan}\left[\frac{2\, i\, \text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Cos}[c+d x]\, \text{Cot}\left[\frac{c}{2}\right] (C\, \text{Cos}[c+d x]+A\, \text{Sec}[c+d x])\right)\Big/$$

$$\left(d\, (a\, (1+\text{Cos}[c+d x]))^{3/2}\, (2\, A+C+C\, \text{Cos}[2\, c+2\, d x]) \sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}\right)+$$

$$\left(8\sqrt{2}\, A\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Cos}[c+d x]\, \text{Csc}\left[\frac{c}{2}\right] (C\, \text{Cos}[c+d x]+A\, \text{Sec}[c+d x])\right.$$

$$\left.\left(-d x\, \text{Cos}\left[\frac{c}{2}\right]+2\, \text{Log}\left[\sqrt{2}+2\, \text{Cos}\left[\frac{d x}{2}\right] \text{Sin}\left[\frac{c}{2}\right]+2\, \text{Cos}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]\right] \text{Sin}\left[\frac{c}{2}\right]+\frac{4\, i\sqrt{2}\, \text{ArcTan}\left[\frac{2\, i\, \text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\, \text{Sin}\left[\frac{c}{2}\right]\right) \text{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right] \text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\, (a\, (1+\text{Cos}[c+d x]))^{3/2}\, (2\, A+C+C\, \text{Cos}[2\, c+2\, d x]) \left(4\, \text{Cos}\left[\frac{c}{2}\right]^2+4\, \text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{(-A-C)\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Cos}[c+d x]\, (C\, \text{Cos}[c+d x]+A\, \text{Sec}[c+d x])}{d\, (a\, (1+\text{Cos}[c+d x]))^{3/2}\, (2\, A+C+C\, \text{Cos}[2\, c+2\, d x]) \left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+$$

$$\frac{(A+C)\, \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \text{Cos}[c+d x]\, (C\, \text{Cos}[c+d x]+A\, \text{Sec}[c+d x])}{d\, (a\, (1+\text{Cos}[c+d x]))^{3/2}\, (2\, A+C+C\, \text{Cos}[2\, c+2\, d x]) \left(\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}$$

- **Problem 116: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\, \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^2}{(a+a\, \text{Cos}[c+d x])^{3/2}}\, dx$$

Optimal (type 3, 158 leaves, 7 steps) :

$$-\frac{3\, A\, \text{ArcTanh}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{a+a\, \text{Cos}[c+d x]}}\right]}{a^{3/2}\, d}+\frac{(9\, A+C)\, \text{ArcTanh}\left[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{2}\, \sqrt{a+a\, \text{Cos}[c+d x]}}\right]}{2\sqrt{2}\, a^{3/2}\, d}-\frac{(A+C)\, \text{Tan}[c+d x]}{2\, d\, (a+a\, \text{Cos}[c+d x])^{3/2}}+\frac{(3\, A+C)\, \text{Tan}[c+d x]}{2\, a\, d\sqrt{a+a\, \text{Cos}[c+d x]}}$$

Result (type 3, 2438 leaves) :

$$\Bigg((3-3\,i)\,A\,\left(1+e^{i c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16\,i)\,e^{\frac{3 i c}{2}+i d x}+(20+20\,i)\,\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34\,i)\,e^{\frac{5 i c}{2}+2 i d x}-(20+20\,i)\,\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+(16-16\,i)\,e^{\frac{7 i c}{2}+3 i d x}+$$

$$(4+4\,i)\,\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8\,i\,e^{\frac{1}{2} i (c+d x)}-16\,\sqrt{2}\,e^{i (c+d x)}-40\,i\,e^{\frac{3}{2} i (c+d x)}+34\,\sqrt{2}\,e^{2 i (c+d x)}+40\,i\,e^{\frac{5}{2} i (c+d x)}-$$

$$16\,\sqrt{2}\,e^{3 i (c+d x)}-8\,i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\Big)\,x\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\left(C+A\,\mathrm{Sec}[c+d x]^2\right)\Bigg)\Bigg/$$

$$\Bigg(\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4\,i\,e^{i (c+d x)}+2\,\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\right)^2\right.$$

$$\left.(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])\right)\Bigg)+$$

$$\frac{6\,i\,\sqrt{2}\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\left(C+A\,\mathrm{Sec}[c+d x]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])}-$$

$$\frac{2\,(9\,A+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]\left(C+A\,\mathrm{Sec}[c+d x]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])}+$$

$$\frac{2\,(9\,A+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right]\left(C+A\,\mathrm{Sec}[c+d x]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])}+$$

$$\frac{3\,\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\left(C+A\,\mathrm{Sec}[c+d x]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])}-$$

$$\Bigg((3-3\,i)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\left(C+A\,\mathrm{Sec}[c+d x]^2\right)$$

$$\left((1+i)\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-i)\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Bigg/$$

$$\left(\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\Bigg(\left(\frac{3}{2}+\frac{3\,i}{2}\right)\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\mathrm{Cos}[c+d x]^2\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\left(C+A\,\mathrm{Sec}[c+d x]^2\right)$$

$$\left((1+i)\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-i)\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Bigg/$$

$$\left(\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+d x]))^{3/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d x])\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\frac{24\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\,\text{Cot}\left[\frac{c}{2}\right]\left(C+A\,\text{Sec}[c+dx]^2\right)}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}-$$

$$\left(12\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\,\text{Csc}\left[\frac{c}{2}\right]\left(C+A\,\text{Sec}[c+dx]^2\right)\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\left(C+A\,\text{Sec}[c+dx]^2\right)}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right)^2}+$$

$$\frac{(-A-C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\left(C+A\,\text{Sec}[c+dx]^2\right)}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right)^2}+$$

$$\frac{4\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\left(C+A\,\text{Sec}[c+dx]^2\right)}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-$$

$$\frac{4\,A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\left(C+A\,\text{Sec}[c+dx]^2\right)}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 117: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^3}{(a+a\,\text{Cos}[c+dx])^{3/2}}\,dx$$

Optimal (type 3, 217 leaves, 8 steps) :

$$\frac{(19 A+8 C) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{4 a^{3/2} d}-\frac{(13 A+5 C) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{2 \sqrt{2} a^{3/2} d}-$$

$$\frac{(7 A+2 C) \operatorname{Tan}[c+d x]}{4 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(A+C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(2 A+C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 1792 leaves):

$$\frac{2 (13 A+5 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])}-$$

$$\frac{2 (13 A+5 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])}+$$

$$\frac{(19 A+8 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\sqrt{2}+2 \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{\sqrt{2} d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])}+$$

$$\left(i (19 A+8 C) \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(2 d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(i (19 A+8 C) \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(2 d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left((19 A+8 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[2-\sqrt{2} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(4 d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left((19 A+8 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[2+\sqrt{2} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(4 d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\frac{(-A-C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Cos}[c+d x]^2 \left(C+A \operatorname{Sec}[c+d x]^2\right)}{d (a (1+\operatorname{Cos}[c+d x]))^{3/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right)^2}+$$

$$\frac{(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\,\left(-5\,A\,\text{Cos}\left[\frac{c}{2}\right]+7\,A\,\text{Sin}\left[\frac{c}{2}\right]\right)}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}+$$

$$\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)^2}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\,\left(5\,\text{Cos}\left[\frac{c}{2}\right]+7\,\text{Sin}\left[\frac{c}{2}\right]\right)}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}$$

- **Problem 118: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 266 leaves, 9 steps):

$$-\frac{(47\,A+24\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,a^{3/2}\,d}+\frac{(17\,A+9\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}+\frac{3\,(7\,A+4\,C)\,\text{Tan}[c+d\,x]}{8\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$

$$\frac{(13\,A+6\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(A+C)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(5\,A+3\,C)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{6\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1019 leaves):

$$\frac{(-17A-9C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right]}{d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}}+$$

$$\frac{(17A+9C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right]}{d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}}+\frac{(-47A-24C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{4\sqrt{2}\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}}+$$

$$\left(\mathrm{i}\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(-47\sqrt{2}\,A-24\sqrt{2}\,C+94\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+48\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$

$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{i}\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(-47\sqrt{2}\,A-24\sqrt{2}\,C+94\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+48\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$

$$\left(8\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\left(-47\sqrt{2}\,A-24\sqrt{2}\,C+94\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+48\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$

$$\left(16\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\left(-47\sqrt{2}\,A-24\sqrt{2}\,C+94\,A\,\mathrm{Sin}\left[\frac{c}{2}\right]+48\,C\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$

$$\left(16\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Sec}[c+dx]^3\left(47\,A\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]-12\,C\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]+91\,A\,\mathrm{Sin}\left[\frac{3c}{2}+\frac{3dx}{2}\right]+60\,C\,\mathrm{Sin}\left[\frac{3c}{2}+\frac{3dx}{2}\right]+\right.\right.$$

$$\left.\left.11\,A\,\mathrm{Sin}\left[\frac{5c}{2}+\frac{5dx}{2}\right]+12\,C\,\mathrm{Sin}\left[\frac{5c}{2}+\frac{5dx}{2}\right]+63\,A\,\mathrm{Sin}\left[\frac{7c}{2}+\frac{7dx}{2}\right]+36\,C\,\mathrm{Sin}\left[\frac{7c}{2}+\frac{7dx}{2}\right]\right)\right)\Big/\left(96\,d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\right)$$

## Problem 123: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]}{(a+a\,\mathrm{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 3, 162 leaves, 7 steps):

$$\frac{2\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{a^{5/2}\,d}-\frac{(43A-5C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{16\sqrt{2}\,a^{5/2}\,d}-\frac{(A+C)\,\mathrm{Sin}[c+dx]}{4\,d\,(a+a\,\mathrm{Cos}[c+dx])^{5/2}}-\frac{(11A-5C)\,\mathrm{Sin}[c+dx]}{16\,a\,d\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}}$$

Result (type 3, 2503 leaves):

$$-\Bigg(\Bigg((4-4\,i)\,A\,(1+e^{i\,c})\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+$$

$$(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-$$

$$16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\,x\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\,\mathrm{Cos}[c+d\,x]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\Bigg)\Big/$$

$$\Bigg(\Big((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\Big)\,(-1+e^{i\,c})\,\Big(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\Big)^2$$

$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\Bigg)\Bigg)-$$

$$\left(8\,i\,\sqrt{2}\,A\,\mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]}{-\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]}\Big]\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\,\mathrm{Cos}[c+d\,x]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$

$$\frac{(43\,A-5\,C)\,\mathrm{Cos}[\frac{c}{2}+\frac{d\,x}{2}]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\Big[\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]\Big]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{(-43\,A+5\,C)\,\mathrm{Cos}[\frac{c}{2}+\frac{d\,x}{2}]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\Big[\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]+\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]\Big]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}-$$

$$\left(4\,\sqrt{2}\,A\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\Big[2-\sqrt{2}\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]-\sqrt{2}\,\mathrm{Sin}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]\Big]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$

$$\Bigg((2-2\,i)\,\sqrt{2}\,\mathrm{ArcTan}\Big[\frac{\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]+\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]-\sqrt{2}\,\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]}{\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]+\sqrt{2}\,\mathrm{Cos}[\frac{c}{4}+\frac{d\,x}{4}]-\mathrm{Sin}[\frac{c}{4}+\frac{d\,x}{4}]}\Big]\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\,\mathrm{Cos}[c+d\,x]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])$$

$$\Big((1+i)\,\mathrm{Cos}\Big[\frac{c}{4}\Big]+\sqrt{2}\,\mathrm{Cos}\Big[\frac{c}{4}\Big]-(1-i)\,\mathrm{Sin}\Big[\frac{c}{4}\Big]-i\,\sqrt{2}\,\mathrm{Sin}\Big[\frac{c}{4}\Big]\Big)\,\Big((-1-i)\,A\,\mathrm{Cos}\Big[\frac{c}{4}\Big]+\sqrt{2}\,A\,\mathrm{Cos}\Big[\frac{c}{4}\Big]+(1-i)\,A\,\mathrm{Sin}\Big[\frac{c}{4}\Big]-i\,\sqrt{2}\,A\,\mathrm{Sin}\Big[\frac{c}{4}\Big]\Big)\Bigg)\Big/$$

$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\Big(\mathrm{Cos}\Big[\frac{c}{2}\Big]+\mathrm{Sin}\Big[\frac{c}{2}\Big]\Big)\right)-$$

$$\Bigg((1+i)\,\sqrt{2}\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\Big[2+\sqrt{2}\,\mathrm{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]-\sqrt{2}\,\mathrm{Sin}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]\Big]\,(C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])$$

$$\Big((1+i)\,\mathrm{Cos}\Big[\frac{c}{4}\Big]+\sqrt{2}\,\mathrm{Cos}\Big[\frac{c}{4}\Big]-(1-i)\,\mathrm{Sin}\Big[\frac{c}{4}\Big]-i\,\sqrt{2}\,\mathrm{Sin}\Big[\frac{c}{4}\Big]\Big)\,\Big((-1-i)\,A\,\mathrm{Cos}\Big[\frac{c}{4}\Big]+\sqrt{2}\,A\,\mathrm{Cos}\Big[\frac{c}{4}\Big]+(1-i)\,A\,\mathrm{Sin}\Big[\frac{c}{4}\Big]-i\,\sqrt{2}\,A\,\mathrm{Sin}\Big[\frac{c}{4}\Big]\Big)\Bigg)\Big/$$

$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\Big(\mathrm{Cos}\Big[\frac{c}{2}\Big]+\mathrm{Sin}\Big[\frac{c}{2}\Big]\Big)\right)-$$

$$\left(32\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,\text{Cot}\left[\frac{c}{2}\right]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}\right)+$$

$$\left(16\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{(-A-C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+$$

$$\frac{(-11\,A+5\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{(A+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^4}+$$

$$\frac{(11\,A-5\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 124: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 199 leaves, 8 steps) :

$$-\frac{5\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}+\frac{(115\,A+3\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A+C)\,\text{Tan}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(15\,A-C)\,\text{Tan}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(35\,A+3\,C)\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 2191 leaves) :

$$\Bigg((10-10\,i)\,A\,\left(1+e^{i\,c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)\,x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\Bigg)\Bigg/$$

$$\Bigg(\left(\left(-1-i\right)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\Bigg)+$$

$$\frac{20\,i\,\sqrt{2}\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{(-115\,A-3\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{(115\,A+3\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{10\,\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}-$$

$$\Bigg((5-5\,i)\,\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)$$

$$\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\text{Sin}\left[\frac{c}{4}\right]-i\,\sqrt{2}\,A\,\text{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Bigg/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left((5+5 i) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[2+\sqrt{2} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\left(C+A \operatorname{Sec}[c+d x]^2\right)\right.$$
$$\left.\left((1+i) \operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2} \operatorname{Cos}\left[\frac{c}{4}\right]-(1-i) \operatorname{Sin}\left[\frac{c}{4}\right]-i \sqrt{2} \operatorname{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i) A \operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2} A \operatorname{Cos}\left[\frac{c}{4}\right]+(1-i) A \operatorname{Sin}\left[\frac{c}{4}\right]-i \sqrt{2} A \operatorname{Sin}\left[\frac{c}{4}\right]\right)\right) \Big/$$
$$\left(\sqrt{2}\, d\,(a\,(1+\operatorname{Cos}[c+d x]))^{5/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$
$$\frac{80 i A \operatorname{ArcTan}\left[\frac{2 i \operatorname{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2 \operatorname{Sin}\left[\frac{c}{2}\right]\right) \operatorname{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4 \operatorname{Cos}\left[\frac{c}{2}\right]^2+4 \operatorname{Sin}\left[\frac{c}{2}\right]^2}}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Cot}\left[\frac{c}{2}\right]\left(C+A \operatorname{Sec}[c+d x]^2\right)}{d\,(a\,(1+\operatorname{Cos}[c+d x]))^{5/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x]) \sqrt{-2+4 \operatorname{Cos}\left[\frac{c}{2}\right]^2+4 \operatorname{Sin}\left[\frac{c}{2}\right]^2}}-$$
$$\left(40 \sqrt{2} A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Csc}\left[\frac{c}{2}\right]\left(C+A \operatorname{Sec}[c+d x]^2\right)\right.$$
$$\left.\left(-d x \operatorname{Cos}\left[\frac{c}{2}\right]+2 \operatorname{Log}\left[\sqrt{2}+2 \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]+2 \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]\right] \operatorname{Sin}\left[\frac{c}{2}\right]+\frac{4 i \sqrt{2} \operatorname{ArcTan}\left[\frac{2 i \operatorname{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2 \operatorname{Sin}\left[\frac{c}{2}\right]\right) \operatorname{Tan}\left[\frac{d x}{4}\right]}{\sqrt{-2+4 \operatorname{Cos}\left[\frac{c}{2}\right]^2+4 \operatorname{Sin}\left[\frac{c}{2}\right]^2}}\right] \operatorname{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4 \operatorname{Cos}\left[\frac{c}{2}\right]^2+4 \operatorname{Sin}\left[\frac{c}{2}\right]^2}}\right)\right) \Big/$$
$$\left(d\,(a\,(1+\operatorname{Cos}[c+d x]))^{5/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\left(4 \operatorname{Cos}\left[\frac{c}{2}\right]^2+4 \operatorname{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Cos}[c+d x]\left(C+A \operatorname{Sec}[c+d x]^2\right)\right.$$
$$\left.\left(24 A \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]-8 C \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]+75 A \operatorname{Sin}\left[\frac{3 c}{2}+\frac{3 d x}{2}\right]+11 C \operatorname{Sin}\left[\frac{3 c}{2}+\frac{3 d x}{2}\right]+35 A \operatorname{Sin}\left[\frac{5 c}{2}+\frac{5 d x}{2}\right]+3 C \operatorname{Sin}\left[\frac{5 c}{2}+\frac{5 d x}{2}\right]\right)\right) \Big/$$
$$\left(16\, d\,(a\,(1+\operatorname{Cos}[c+d x]))^{5/2}\,(2 A+C+C \operatorname{Cos}[2 c+2 d x])\right)$$

- **Problem 125: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3}{(a+a \operatorname{Cos}[c+d x])^{5/2}}\, dx$$

Optimal (type 3, 262 leaves, 9 steps) :

$$\frac{(39 A+8 C) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{4 a^{5/2} d}-\frac{(219 A+43 C) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-\frac{(63 A+11 C) \operatorname{Tan}[c+d x]}{16 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}-$$

$$\frac{(A+C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(19 A+3 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(31 A+7 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{16 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 1250 leaves):

$$\frac{(219 A+43 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{2 d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])}+$$

$$\frac{(-219 A-43 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{2 d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])}+$$

$$\frac{\sqrt{2} (39 A+8 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\sqrt{2}+2 \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right)}{d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])}+$$

$$\left(i (39 A+8 C) \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left(i (39 A+8 C) \operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \operatorname{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\operatorname{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left((39 A+8 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[2-\sqrt{2} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(2 d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\left((39 A+8 C) \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[2+\sqrt{2} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(\sqrt{2}-2 \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right) \Big/$$

$$\left(2 d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x]) \left(-1+\sqrt{2} \operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \left(C+A \operatorname{Sec}[c+d x]^2\right) \left(47 A \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]+27 C \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]+79 A \operatorname{Sin}\left[\frac{3 c}{2}+\frac{3 d x}{2}\right]+3 C \operatorname{Sin}\left[\frac{3 c}{2}+\frac{3 d x}{2}\right]+127 A \operatorname{Sin}\left[\frac{5 c}{2}+\frac{5 d x}{2}\right]+\right.\right.$$

$$\left.\left.19 C \operatorname{Sin}\left[\frac{5 c}{2}+\frac{5 d x}{2}\right]+63 A \operatorname{Sin}\left[\frac{7 c}{2}+\frac{7 d x}{2}\right]+11 C \operatorname{Sin}\left[\frac{7 c}{2}+\frac{7 d x}{2}\right]\right)\right) \Big/ \left(32 d (a (1+\operatorname{Cos}[c+d x]))^{5/2} (2 A+C+C \operatorname{Cos}[2 c+2 d x])\right)$$

## Problem 126: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \text{Cos}[c+d x]^{5/2} (a+a \text{Cos}[c+d x]) \left(A+C \text{Cos}[c+d x]^2\right) dx$$

Optimal (type 4, 196 leaves, 8 steps):

$$\frac{2 a (9 A+7 C) \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{15 d}+\frac{10 a (11 A+9 C) \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{231 d}+\frac{10 a (11 A+9 C) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{231 d}+\frac{2 a (9 A+7 C) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{45 d}+\frac{2 a (11 A+9 C) \text{Cos}[c+d x]^{5/2} \text{Sin}[c+d x]}{77 d}+\frac{2 a C \text{Cos}[c+d x]^{7/2} \text{Sin}[c+d x]}{9 d}+\frac{2 a C \text{Cos}[c+d x]^{9/2} \text{Sin}[c+d x]}{11 d}$$

Result (type 5, 964 leaves):

$$a \left(\sqrt{\text{Cos}[c+d x]} (1+\text{Cos}[c+d x]) \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(-\frac{(9 A+7 C) \text{Cot}[c]}{15 d}+\frac{(506 A+435 C) \text{Cos}[d x] \text{Sin}[c]}{1848 d}+\frac{(18 A+19 C) \text{Cos}[2 d x] \text{Sin}[2 c]}{180 d}+\frac{(44 A+57 C) \text{Cos}[3 d x] \text{Sin}[3 c]}{1232 d}+\frac{C \text{Cos}[4 d x] \text{Sin}[4 c]}{72 d}+\frac{C \text{Cos}[5 d x] \text{Sin}[5 c]}{176 d}+\frac{(506 A+435 C) \text{Cos}[c] \text{Sin}[d x]}{1848 d}+\frac{(18 A+19 C) \text{Cos}[2 c] \text{Sin}[2 d x]}{180 d}+\frac{(44 A+57 C) \text{Cos}[3 c] \text{Sin}[3 d x]}{1232 d}+\frac{C \text{Cos}[4 c] \text{Sin}[4 d x]}{72 d}+\frac{C \text{Cos}[5 c] \text{Sin}[5 d x]}{176 d}\right)-\frac{1}{21 d \sqrt{1+\text{Cot}[c]^2}} 5 A (1+\text{Cos}[c+d x]) \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{77 d \sqrt{1+\text{Cot}[c]^2}} 15 C (1+\text{Cos}[c+d x]) \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{10 d} 3 A (1+\text{Cos}[c+d x]) \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\right.$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{30\,d}7\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 127: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 165 leaves, 7 steps) :

$$\frac{2\,a\,(9\,A+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{2\,a\,(7\,A+5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{2\,a\,(7\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+$$

$$\frac{2\,a\,(9\,A+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{2\,a\,C\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,a\,C\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 918 leaves) :

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\ (1+\text{Cos}[c+d\,x])\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(-\frac{(9\,A+7\,C)\ \text{Cot}[c]}{15\,d}+\frac{(28\,A+23\,C)\ \text{Cos}[d\,x]\ \text{Sin}[c]}{84\,d}+\frac{(18\,A+19\,C)\ \text{Cos}[2\,d\,x]\ \text{Sin}[2\,c]}{180\,d}+\frac{C\,\text{Cos}[3\,d\,x]\ \text{Sin}[3\,c]}{28\,d}+\frac{C\,\text{Cos}[4\,d\,x]\ \text{Sin}[4\,c]}{72\,d}+\right.$$

$$\left.\frac{(28\,A+23\,C)\ \text{Cos}[c]\ \text{Sin}[d\,x]}{84\,d}+\frac{(18\,A+19\,C)\ \text{Cos}[2\,c]\ \text{Sin}[2\,d\,x]}{180\,d}+\frac{C\,\text{Cos}[3\,c]\ \text{Sin}[3\,d\,x]}{28\,d}+\frac{C\,\text{Cos}[4\,c]\ \text{Sin}[4\,d\,x]}{72\,d}\right)-\frac{1}{3\,d\sqrt{1+\text{Cot}[c]^2}}$$

$$A\ (1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -$$

$$\frac{1}{21\,d\sqrt{1+\text{Cot}[c]^2}}5\,C\ (1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -\ \frac{1}{10\,d}3\,A\ (1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{30\,d}7\,C\ (1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 128: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])\left(A+C\,\text{Cos}[c+d x]^2\right)dx$$

Optimal (type 4, 134 leaves, 6 steps):

$$\frac{2\,a\,(5A+3C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{5d}+\frac{2\,a\,(7A+5C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{21d}+$$
$$\frac{2\,a\,(7A+5C)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{21d}+\frac{2\,a\,C\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{5d}+\frac{2\,a\,C\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{7d}$$

Result (type 5, 872 leaves):

$$a\left(\sqrt{\text{Cos}[c+d x]}\,(1+\text{Cos}[c+d x])\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\left(-\frac{(5A+3C)\,\text{Cot}[c]}{5d}+\frac{(28A+23C)\,\text{Cos}[d x]\,\text{Sin}[c]}{84d}+\frac{C\,\text{Cos}[2 d x]\,\text{Sin}[2 c]}{10d}+\right.\right.$$

$$\left.\frac{C\,\text{Cos}[3 d x]\,\text{Sin}[3 c]}{28d}+\frac{(28A+23C)\,\text{Cos}[c]\,\text{Sin}[d x]}{84d}+\frac{C\,\text{Cos}[2 c]\,\text{Sin}[2 d x]}{10d}+\frac{C\,\text{Cos}[3 c]\,\text{Sin}[3 d x]}{28d}\right)-\frac{1}{3d\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{21d\sqrt{1+\text{Cot}[c]^2}}5\,C\,(1+\text{Cos}[c+d x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;-\;\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Bigg/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)-\frac{1}{10\,d}3\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Bigg/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)\Bigg)$$

- **Problem 129: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 101 leaves, 5 steps) :

$$\frac{2a(5A+3C)\,\text{EllipticE}\left[\frac{1}{2}(c+dx),2\right]}{5d}+\frac{2a(3A+C)\,\text{EllipticF}\left[\frac{1}{2}(c+dx),2\right]}{3d}+\frac{2aC\sqrt{\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{3d}+\frac{2aC\,\text{Cos}[c+dx]^{3/2}\,\text{Sin}[c+dx]}{5d}$$

Result (type 5, 824 leaves):

$$a\left(\sqrt{\text{Cos}[c+dx]}\,(1+\text{Cos}[c+dx])\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(-\frac{(5A+3C)\,\text{Cot}[c]}{5d}+\frac{C\,\text{Cos}[dx]\,\text{Sin}[c]}{3d}+\frac{C\,\text{Cos}[2dx]\,\text{Sin}[2c]}{10d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[dx]}{3d}+\frac{C\,\text{Cos}[2c]\,\text{Sin}[2dx]}{10d}\right)-\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}A\,(1+\text{Cos}[c+dx])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sec}[dx-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3d\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+dx])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Sec}[dx-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2d}A\,(1+\text{Cos}[c+dx])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[dx+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{1+\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{\text{Cos}[c]\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[dx+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10d}3C\,(1+\text{Cos}[c+dx])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 130: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 95 leaves, 5 steps):

$$-\frac{2\,a\,(A-C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{d}+\frac{2\,a\,(3\,A+C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 813 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(-\frac{(-2\,A+C+C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{2\,d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}\right)-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]] \sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1 + \text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} + \frac{1}{2 d} A (1 + \text{Cos}[c + d x]) \text{Csc}[c] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right) \Big/\right.$$

$$\left(\sqrt{1 - \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]} \sqrt{1 + \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]} \sqrt{\text{Cos}[c] \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]] \sqrt{1 + \text{Tan}[c]^2}} \sqrt{1 + \text{Tan}[c]^2}\right) -$$

$$\left.\frac{\frac{\text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]}{\sqrt{1 + \text{Tan}[c]^2}} + \frac{2 \text{Cos}[c]^2 \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]] \sqrt{1 + \text{Tan}[c]^2}}{\text{Cos}[c]^2 + \text{Sin}[c]^2}}{\sqrt{\text{Cos}[c] \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]] \sqrt{1 + \text{Tan}[c]^2}}}\right) - \frac{1}{2 d} C (1 + \text{Cos}[c + d x]) \text{Csc}[c] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right) \Big/\right.$$

$$\left(\sqrt{1 - \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]} \sqrt{1 + \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]} \sqrt{\text{Cos}[c] \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]] \sqrt{1 + \text{Tan}[c]^2}} \sqrt{1 + \text{Tan}[c]^2}\right) -$$

$$\left.\left.\frac{\frac{\text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]}{\sqrt{1 + \text{Tan}[c]^2}} + \frac{2 \text{Cos}[c]^2 \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]] \sqrt{1 + \text{Tan}[c]^2}}{\text{Cos}[c]^2 + \text{Sin}[c]^2}}{\sqrt{\text{Cos}[c] \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]] \sqrt{1 + \text{Tan}[c]^2}}}\right)\right)$$

- **Problem 131: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a + a \text{Cos}[c + d x]) \left(A + C \text{Cos}[c + d x]^2\right)}{\text{Cos}[c + d x]^{5/2}} \, dx$$

Optimal (type 4, 95 leaves, 5 steps) :

$$-\frac{2\,a\,(A-C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{d}+\frac{2\,a\,(A+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 817 leaves) :

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$
$$\left(-\frac{(-2\,A+C+C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{2\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+3\,A\,\text{Sin}[d\,x])}{3\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$
$$\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,+\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left.\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\right.$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

## Problem 132: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{(a+a\,\text{Cos}[c+d x])\left(A+C\,\text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{7/2}}\,dx$$

Optimal (type 4, 132 leaves, 6 steps):

$$-\frac{2 a (3 A+5 C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{5 d}+\frac{2 a (A+3 C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 d}+$$

$$\frac{2 a A\,\text{Sin}[c+d x]}{5 d\,\text{Cos}[c+d x]^{5/2}}+\frac{2 a A\,\text{Sin}[c+d x]}{3 d\,\text{Cos}[c+d x]^{3/2}}+\frac{2 a (3 A+5 C)\,\text{Sin}[c+d x]}{5 d\sqrt{\text{Cos}[c+d x]}}$$

Result (type 5, 851 leaves):

$$a\left(\sqrt{\text{Cos}[c+d x]}\,(1+\text{Cos}[c+d x])\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\left(\frac{(3 A+5 C)\,\text{Csc}[c]\,\text{Sec}[c]}{5 d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d x]^3\,\text{Sin}[d x]}{5 d}+\right.\right.$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d x]^2\,(3 A\,\text{Sin}[c]+5 A\,\text{Sin}[d x])}{15 d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d x]\,(5 A\,\text{Sin}[c]+9 A\,\text{Sin}[d x]+15 C\,\text{Sin}[d x])}{15 d}\right)-\frac{1}{3 d\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 133: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 165 leaves, 7 steps):

$$-\frac{2\,a\,(3\,A+5\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{2\,a\,(5\,A+7\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,a\,(5\,A+7\,C)\,\text{Sin}[c+d\,x]}{21\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,(3\,A+5\,C)\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 895 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(\frac{(3\,A+5\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{7\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(5\,A\,\text{Sin}[c]+7\,A\,\text{Sin}[d\,x])}{35\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(21\,A\,\text{Sin}[c]+25\,A\,\text{Sin}[d\,x]+35\,C\,\text{Sin}[d\,x])}{105\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(25\,A\,\text{Sin}[c]+35\,C\,\text{Sin}[c]+63\,A\,\text{Sin}[d\,x]+105\,C\,\text{Sin}[d\,x])}{105\,d}\right)-\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}\right.$$

$$5\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},\,-\frac{1}{4}\right\},\,\left\{\frac{3}{4}\right\},\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2 d}C\,(1+\text{Cos}[c+d x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 134: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^2\,\left(A+C\,\text{Cos}[c+d x]^2\right)\,dx$$

Optimal (type 4, 230 leaves, 9 steps):

$$\frac{4 a^2\,(9 A+7 C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{15 d}+\frac{8 a^2\,(33 A+25 C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{231 d}+$$
$$\frac{8 a^2\,(33 A+25 C)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{231 d}+\frac{4 a^2\,(9 A+7 C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{45 d}+\frac{2 a^2\,(99 A+89 C)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{693 d}+$$
$$\frac{2 C\,\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^2\,\text{Sin}[c+d x]}{11 d}+\frac{8 C\,\text{Cos}[c+d x]^{5/2}\,\left(a^2+a^2\,\text{Cos}[c+d x]\right)\,\text{Sin}[c+d x]}{99 d}$$

Result (type 5, 982 leaves):

$$\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$
$$\left(-\frac{(9 A+7 C)\,\text{Cot}[c]}{15 d}+\frac{(1122 A+941 C)\,\text{Cos}[d x]\,\text{Sin}[c]}{3696 d}+\frac{(18 A+19 C)\,\text{Cos}[2 d x]\,\text{Sin}[2 c]}{180 d}+\frac{(44 A+101 C)\,\text{Cos}[3 d x]\,\text{Sin}[3 c]}{2464 d}+\right.$$
$$\frac{C\,\text{Cos}[4 d x]\,\text{Sin}[4 c]}{72 d}+\frac{C\,\text{Cos}[5 d x]\,\text{Sin}[5 c]}{352 d}+\frac{(1122 A+941 C)\,\text{Cos}[c]\,\text{Sin}[d x]}{3696 d}+\frac{(18 A+19 C)\,\text{Cos}[2 c]\,\text{Sin}[2 d x]}{180 d}+$$

$$\frac{(44 A + 101 C)\, \text{Cos}[3 c]\, \text{Sin}[3 d x]}{2464 d} + \frac{C\, \text{Cos}[4 c]\, \text{Sin}[4 d x]}{72 d} + \frac{C\, \text{Cos}[5 c]\, \text{Sin}[5 d x]}{352 d}\Bigg) - \frac{1}{7 d \sqrt{1 + \text{Cot}[c]^2}}$$

$$2 A\, (a + a\, \text{Cos}[c + d x])^2\, \text{Csc}[c]\, \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}\, \sqrt{-\sqrt{1 + \text{Cot}[c]^2}\, \text{Sin}[c]\, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}\, \sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} -$$

$$\frac{1}{231 d \sqrt{1 + \text{Cot}[c]^2}} 50 C\, (a + a\, \text{Cos}[c + d x])^2\, \text{Csc}[c]\, \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]]\, \sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}\, \sqrt{-\sqrt{1 + \text{Cot}[c]^2}\, \text{Sin}[c]\, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} - \frac{1}{10 d} 3 A\, (a + a\, \text{Cos}[c + d x])^2\, \text{Csc}[c]\, \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \text{Tan}[c]\right) \Big/$$

$$\left(\sqrt{1 - \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]}\, \sqrt{1 + \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]}\, \sqrt{\text{Cos}[c]\, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \sqrt{1 + \text{Tan}[c]^2}}\, \sqrt{1 + \text{Tan}[c]^2}\right) -$$

$$\frac{\frac{\text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \text{Tan}[c]}{\sqrt{1 + \text{Tan}[c]^2}} + \frac{2\, \text{Cos}[c]^2\, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \sqrt{1 + \text{Tan}[c]^2}}{\text{Cos}[c]^2 + \text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \sqrt{1 + \text{Tan}[c]^2}}}\Bigg) - \frac{1}{30 d} 7 C\, (a + a\, \text{Cos}[c + d x])^2\, \text{Csc}[c]\, \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4$$

$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \text{Tan}[c]\right) \Big/$$

$$\left(\sqrt{1 - \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]}\, \sqrt{1 + \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]}\, \sqrt{\text{Cos}[c]\, \text{Cos}[d x + \text{ArcTan}[\text{Tan}[c]]]\, \sqrt{1 + \text{Tan}[c]^2}}\, \sqrt{1 + \text{Tan}[c]^2}\right) -$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 135: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^2\,\left(A+C\,\text{Cos}[c+d x]^2\right)\,dx$$

Optimal (type 4, 197 leaves, 8 steps):

$$\frac{16\,a^2\,(3 A+2 C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d x),\,2\right]}{15\,d}+\frac{4\,a^2\,(7 A+5 C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d x),\,2\right]}{21\,d}+\frac{4\,a^2\,(7 A+5 C)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{21\,d}+\frac{2\,a^2\,(21 A+19 C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{105\,d}+\frac{2\,C\,\text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^2\,\text{Sin}[c+d x]}{9\,d}+\frac{8\,C\,\text{Cos}[c+d x]^{3/2}\,\left(a^2+a^2\,\text{Cos}[c+d x]\right)\,\text{Sin}[c+d x]}{63\,d}$$

Result (type 5, 936 leaves):

$$\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$
$$\left(-\frac{4\,(3 A+2 C)\,\text{Cot}[c]}{15\,d}+\frac{(28 A+23 C)\,\text{Cos}[d x]\,\text{Sin}[c]}{84\,d}+\frac{(18 A+37 C)\,\text{Cos}[2 d x]\,\text{Sin}[2 c]}{360\,d}+\frac{C\,\text{Cos}[3 d x]\,\text{Sin}[3 c]}{28\,d}+\frac{C\,\text{Cos}[4 d x]\,\text{Sin}[4 c]}{144\,d}+\right.$$
$$\left.\frac{(28 A+23 C)\,\text{Cos}[c]\,\text{Sin}[d x]}{84\,d}+\frac{(18 A+37 C)\,\text{Cos}[2 c]\,\text{Sin}[2 d x]}{360\,d}+\frac{C\,\text{Cos}[3 c]\,\text{Sin}[3 d x]}{28\,d}+\frac{C\,\text{Cos}[4 c]\,\text{Sin}[4 d x]}{144\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$A\,(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$
$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,C\,(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,-\,\frac{1}{5\,d}2\,A\,(a+a\,\text{Cos}[c+d x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{15\,d}4\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 136: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 164 leaves, 7 steps):

$$\frac{4\,a^2\,(5\,A+3\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{8\,a^2\,(7\,A+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{2\,a^2\,(35\,A+33\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d}+\frac{2\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{7\,d}+\frac{8\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{35\,d}$$

Result (type 5, 890 leaves):

$$\sqrt{\text{Cos}[c+d x]}\;(a+a\,\text{Cos}[c+d x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-\frac{(5A+3C)\,\text{Cot}[c]}{5d}+\frac{(28A+51C)\,\text{Cos}[d x]\,\text{Sin}[c]}{168d}+\frac{C\,\text{Cos}[2dx]\,\text{Sin}[2c]}{10d}+\right.$$

$$\left.\frac{C\,\text{Cos}[3dx]\,\text{Sin}[3c]}{56d}+\frac{(28A+51C)\,\text{Cos}[c]\,\text{Sin}[dx]}{168d}+\frac{C\,\text{Cos}[2c]\,\text{Sin}[2dx]}{10d}+\frac{C\,\text{Cos}[3c]\,\text{Sin}[3dx]}{56d}\right)-\frac{1}{3d\sqrt{1+\text{Cot}[c]^2}}$$

$$2A\,(a+a\,\text{Cos}[c+dx])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Sec}[dx-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\;-$$

$$\frac{1}{7d\sqrt{1+\text{Cot}[c]^2}}2C\,(a+a\,\text{Cos}[c+dx])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4$$

$$\text{Sec}[dx-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[dx-\text{ArcTan}[\text{Cot}[c]]]}\;-\frac{1}{2d}A\,(a+a\,\text{Cos}[c+dx])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[dx+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\middle/\right.$$

$$\left(\sqrt{1-\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[dx+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10d}3C\,(a+a\,\text{Cos}[c+dx])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[dx+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\middle/\right.$$

$$\left(\sqrt{1-\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\,\text{Cos}[dx+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)$$

- **Problem 137: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 160 leaves, 7 steps):

$$\frac{16\,a^2\,C\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^2\,(3\,A+C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}-\frac{2\,a^2\,(15\,A-7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+$$
$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{2\,(5\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 658 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(-\frac{(-5\,A+8\,C+5\,A\,\text{Cos}[2\,c]+8\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{20\,d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{20\,d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{2\,d}+\frac{C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{20\,d}\right)-\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;-$$

$$\frac{1}{3\,d\sqrt{1+\text{Cot}[c]^2}}C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;-\;\frac{1}{5\,d}2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 138: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 156 leaves, 7 steps) :

$$-\frac{4 a^2 (A-C) \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{d}+\frac{8 a^2 (A+C) \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 d}-\frac{2 a^2 (5 A-C) \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{3 d}+\frac{2 A (a+a \text{Cos}[c+d x])^2 \text{Sin}[c+d x]}{3 d \text{Cos}[c+d x]^{3/2}}+\frac{8 A \left(a^2+a^2 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{3 d \sqrt{\text{Cos}[c+d x]}}$$

Result (type 5, 865 leaves):

$$\sqrt{\text{Cos}[c+d x]}\, (a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(-\frac{(-2 A+C+C \text{Cos}[2 c]) \text{Csc}[c] \text{Sec}[c]}{2 d}+\frac{C \text{Cos}[d x] \text{Sin}[c]}{6 d}+\frac{C \text{Cos}[c] \text{Sin}[d x]}{6 d}+\frac{A \text{Sec}[c] \text{Sec}[c+d x]^2 \text{Sin}[d x]}{6 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x] (A \text{Sin}[c]+6 A \text{Sin}[d x])}{6 d}\right)-\frac{1}{3 d \sqrt{1+\text{Cot}[c]^2}}$$

$$2 A (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\, \sqrt{-\sqrt{1+\text{Cot}[c]^2}\, \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\, \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{3 d \sqrt{1+\text{Cot}[c]^2}} 2 C (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\, \sqrt{-\sqrt{1+\text{Cot}[c]^2}\, \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2 d} A (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\, \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\, \sqrt{\text{Cos}[c] \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}\, \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2 \text{Cos}[c]^2 \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c] \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2 d} C (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 139: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 156 leaves, 7 steps):

$$-\frac{16\,a^2\,A\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^2\,(A+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}+$$

$$\frac{2\,a^2\,(17\,A+15\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{8\,A\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 5, 656 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(-\frac{(-16\,A-5\,C+5\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{20\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{10\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,A\,\text{Sin}[c]+10\,A\,\text{Sin}[d\,x])}{30\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(10\,A\,\text{Sin}[c]+24\,A\,\text{Sin}[d\,x]+15\,C\,\text{Sin}[d\,x])}{30\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{5\,d}2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 140: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 197 leaves, 8 steps) :

$$-\frac{4 a^2 (3 A+5 C) \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{5 d}+\frac{8 a^2 (3 A+7 C) \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{21 d}+\frac{2 a^2 (33 A+35 C) \text{Sin}[c+d x]}{105 d \text{Cos}[c+d x]^{3/2}}+$$
$$\frac{4 a^2 (3 A+5 C) \text{Sin}[c+d x]}{5 d \sqrt{\text{Cos}[c+d x]}}+\frac{2 A (a+a \text{Cos}[c+d x])^2 \text{Sin}[c+d x]}{7 d \text{Cos}[c+d x]^{7/2}}+\frac{8 A \left(a^2+a^2 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{35 d \text{Cos}[c+d x]^{5/2}}$$

Result (type 5, 913 leaves) :

$$\sqrt{\text{Cos}[c+d x]} (a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(\frac{(3 A+5 C) \text{Csc}[c] \text{Sec}[c]}{5 d}+\frac{A \text{Sec}[c] \text{Sec}[c+d x]^4 \text{Sin}[d x]}{14 d}+\right.$$
$$\frac{\text{Sec}[c] \text{Sec}[c+d x]^3 (5 A \text{Sin}[c]+14 A \text{Sin}[d x])}{70 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x]^2 (42 A \text{Sin}[c]+60 A \text{Sin}[d x]+35 C \text{Sin}[d x])}{210 d}+$$
$$\left.\frac{\text{Sec}[c] \text{Sec}[c+d x] (60 A \text{Sin}[c]+35 C \text{Sin}[c]+126 A \text{Sin}[d x]+210 C \text{Sin}[d x])}{210 d}\right)-\frac{1}{7 d \sqrt{1+\text{Cot}[c]^2}}$$
$$2 A (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{3 d \sqrt{1+\text{Cot}[c]^2}} 2 C (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$
$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{10 d} 3 A (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right)\right/$$
$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]} \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]} \sqrt{\text{Cos}[c] \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}} \sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2 \text{Cos}[c]^2 \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c] \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2 d} C (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

## Problem 141: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 230 leaves, 9 steps):

$$-\frac{16\,a^2\,(2\,A+3\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{4\,a^2\,(5\,A+7\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{2\,a^2\,(19\,A+21\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\text{Cos}[c+d\,x]^{5/2}}+$$

$$\frac{4\,a^2\,(5\,A+7\,C)\,\text{Sin}[c+d\,x]}{21\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{16\,a^2\,(2\,A+3\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{9\,d\,\text{Cos}[c+d\,x]^{9/2}}+\frac{8\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{63\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 5, 955 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(\frac{4\,(2\,A+3\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{15\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^5\,\text{Sin}[d\,x]}{18\,d}+\right.$$

$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,(7\,A\,\text{Sin}[c]+18\,A\,\text{Sin}[d\,x])}{126\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(90\,A\,\text{Sin}[c]+112\,A\,\text{Sin}[d\,x]+63\,C\,\text{Sin}[d\,x])}{630\,d}+$$

$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(25\,A\,\text{Sin}[c]+35\,C\,\text{Sin}[c]+56\,A\,\text{Sin}[d\,x]+84\,C\,\text{Sin}[d\,x])}{105\,d}+$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(112\,A\,\text{Sin}[c]+63\,C\,\text{Sin}[c]+150\,A\,\text{Sin}[d\,x]+210\,C\,\text{Sin}[d\,x])}{630\,d}\right)-$$

$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{15\,d}4\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{5\,d}2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 142: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^3 \left(A+C \text{Cos}[c+d x]^2\right) dx$$

Optimal (type 4, 279 leaves, 10 steps):

$$\frac{4 a^3 (221 A+175 C) \text{EllipticE}\left[\frac{1}{2} (c+d x),2\right]}{195 d}+\frac{4 a^3 (121 A+95 C) \text{EllipticF}\left[\frac{1}{2} (c+d x),2\right]}{231 d}+\frac{4 a^3 (121 A+95 C) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{231 d}+\frac{4 a^3 (221 A+175 C) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{585 d}+\frac{40 a^3 (143 A+118 C) \text{Cos}[c+d x]^{5/2} \text{Sin}[c+d x]}{9009 d}+\frac{2 C \text{Cos}[c+d x]^{5/2} (a+a \text{Cos}[c+d x])^3 \text{Sin}[c+d x]}{13 d}+\frac{12 C \text{Cos}[c+d x]^{5/2} \left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Sin}[c+d x]}{143 a d}+\frac{2 (143 A+145 C) \text{Cos}[c+d x]^{5/2} \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{1287 d}$$

Result (type 5, 1028 leaves):

$$\sqrt{\text{Cos}[c+d x]} (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(-\frac{(221 A+175 C) \text{Cot}[c]}{390 d}+\frac{(2134 A+1811 C) \text{Cos}[d x] \text{Sin}[c]}{7392 d}+\frac{(7592 A+7825 C) \text{Cos}[2 d x] \text{Sin}[2 c]}{74880 d}+\frac{(132 A+215 C) \text{Cos}[3 d x] \text{Sin}[3 c]}{4928 d}+\frac{(13 A+59 C) \text{Cos}[4 d x] \text{Sin}[4 c]}{3744 d}+\frac{3 C \text{Cos}[5 d x] \text{Sin}[5 c]}{704 d}+\frac{C \text{Cos}[6 d x] \text{Sin}[6 c]}{1664 d}+\frac{(2134 A+1811 C) \text{Cos}[c] \text{Sin}[d x]}{7392 d}+\frac{(7592 A+7825 C) \text{Cos}[2 c] \text{Sin}[2 d x]}{74880 d}+\frac{(132 A+215 C) \text{Cos}[3 c] \text{Sin}[3 d x]}{4928 d}+\frac{(13 A+59 C) \text{Cos}[4 c] \text{Sin}[4 d x]}{3744 d}+\frac{3 C \text{Cos}[5 c] \text{Sin}[5 d x]}{704 d}+\frac{C \text{Cos}[6 c] \text{Sin}[6 d x]}{1664 d}\right)-$$

$$\frac{1}{42 d \sqrt{1+\text{Cot}[c]^2}} 11 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{462 d \sqrt{1+\text{Cot}[c]^2}}$$

$$95 C (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{60 d} 17 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{156\,d}35\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 143: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 4, 246 leaves, 9 steps) :

$$\frac{4\,a^3\,(7\,A+5\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(143\,A+105\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{231\,d}+\frac{4\,a^3\,(143\,A+105\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{231\,d}+$$

$$\frac{8\,a^3\,(44\,A+35\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{385\,d}+\frac{2\,C\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{11\,d}+$$

$$\frac{4\,C\,\text{Cos}[c+d\,x]^{3/2}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{33\,a\,d}+\frac{2\,(33\,A+35\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{231\,d}$$

Result (type 5, 982 leaves) :

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(-\frac{(7\,A+5\,C)\,\text{Cot}[c]}{10\,d}+\frac{(2354\,A+1953\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{7392\,d}+\frac{(18\,A+25\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{240\,d}+\frac{(44\,A+189\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{4928\,d}+\right.$$
$$\frac{C\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{96\,d}+\frac{C\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{704\,d}+\frac{(2354\,A+1953\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{7392\,d}+\frac{(18\,A+25\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{240\,d}+$$
$$\left.\frac{(44\,A+189\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{4928\,d}+\frac{C\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{96\,d}+\frac{C\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{704\,d}\right)-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$13\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{22\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20\,d}7\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{4\,d}C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 144: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 213 leaves, 8 steps):

$$\frac{4\,a^3\,(27\,A+17\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{4\,a^3\,(21\,A+11\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+$$
$$\frac{8\,a^3\,(21\,A+16\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d}+\frac{2\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{9\,d}+$$
$$\frac{4\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{21\,a\,d}+\frac{2\,(63\,A+73\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{315\,d}$$

Result (type 5, 936 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(-\frac{(27\,A+17\,C)\,\text{Cot}[c]}{30\,d}+\frac{(84\,A+97\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{336\,d}+\frac{(18\,A+73\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{720\,d}+\frac{3\,C\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{112\,d}+\frac{C\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{288\,d}+\right.$$
$$\left.\frac{(84\,A+97\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{336\,d}+\frac{(18\,A+73\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{720\,d}+\frac{3\,C\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{112\,d}+\frac{C\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{288\,d}\right)-\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}11\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]$$

$$\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20\,d}9\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Big(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\Big)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)-\frac{1}{60\,d}17\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Big(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\Big)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)$$

- **Problem 145: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\big(A+C\,\text{Cos}[c+d\,x]^2\big)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 217 leaves, 8 steps):

$$\frac{4 a^3 (5 A+7 C) \text{EllipticE}\left[\frac{1}{2} (c+d x),2\right]}{5 d}+\frac{4 a^3 (35 A+13 C) \text{EllipticF}\left[\frac{1}{2} (c+d x),2\right]}{21 d}-\frac{4 a^3 (35 A-41 C) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{105 d}+\frac{2 A (a+a \text{Cos}[c+d x])^3 \text{Sin}[c+d x]}{d \sqrt{\text{Cos}[c+d x]}}-\frac{2 (7 A-C) \sqrt{\text{Cos}[c+d x]} \left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Sin}[c+d x]}{7 a d}-\frac{2 (35 A-11 C) \sqrt{\text{Cos}[c+d x]} \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{35 d}$$

Result (type 5, 926 leaves):

$$\sqrt{\text{Cos}[c+d x]} (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(-\frac{(5 A+14 C+15 A \text{Cos}[2 c]+14 C \text{Cos}[2 c]) \text{Csc}[c] \text{Sec}[c]}{40 d}+\frac{(28 A+107 C) \text{Cos}[d x] \text{Sin}[c]}{336 d}+\frac{3 C \text{Cos}[2 d x] \text{Sin}[2 c]}{40 d}+\frac{C \text{Cos}[3 d x] \text{Sin}[3 c]}{112 d}+\frac{(28 A+107 C) \text{Cos}[c] \text{Sin}[d x]}{336 d}+\frac{A \text{Sec}[c] \text{Sec}[c+d x] \text{Sin}[d x]}{4 d}+\frac{3 C \text{Cos}[2 c] \text{Sin}[2 d x]}{40 d}+\frac{C \text{Cos}[3 c] \text{Sin}[3 d x]}{112 d}\right)-\frac{1}{6 d \sqrt{1+\text{Cot}[c]^2}}$$

$$5 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{42 d \sqrt{1+\text{Cot}[c]^2}}13 C (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{4 d}A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]} \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]} \sqrt{\text{Cos}[c] \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]] \sqrt{1+\text{Tan}[c]^2}} \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)-\frac{1}{20\,d}7\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 146: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 211 leaves, 8 steps):

$$-\frac{4\,a^3\,(5\,A-9\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(5\,A+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-\frac{8\,a^3\,(10\,A-3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+$$

$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{4\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{2\,(35\,A-3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{15\,d}$$

Result (type 5, 909 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(-\frac{(-25\,A+18\,C+5\,A\,\text{Cos}[2\,c]+18\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{40\,d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{4\,d}+\frac{C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{40\,d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{4\,d}+\right.$$

$$\left.\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{12\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+9\,A\,\text{Sin}[d\,x])}{12\,d}+\frac{C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{40\,d}\right)-\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$5\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,-$$

$$\frac{1}{2\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}C\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,+\,\frac{1}{4\,d}A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)\,-$$

$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)\,-\,\frac{1}{20\,d}9\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)\,-$$

$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)$$

**Problem 147: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 213 leaves, 8 steps):

$$-\frac{4\,a^3\,(9\,A-5\,C)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(3\,A+5\,C)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-\frac{4\,a^3\,(21\,A+5\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{4\,A\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\,\mathrm{Sin}[c+d\,x]}{5\,a\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{2\,(11\,A+5\,C)\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Sin}[c+d\,x]}{5\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}$$

Result (type 5, 905 leaves):

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(-36\,A+5\,C+15\,C\,\mathrm{Cos}[2\,c])\,\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{40\,d}+\frac{C\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{12\,d}+\frac{C\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{12\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Sin}[d\,x]}{20\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(A\,\mathrm{Sin}[c]+5\,A\,\mathrm{Sin}[d\,x])}{20\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(5\,A\,\mathrm{Sin}[c]+18\,A\,\mathrm{Sin}[d\,x]+5\,C\,\mathrm{Sin}[d\,x])}{20\,d}\right)-\frac{1}{2\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}$$

$$A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-$$

$$\frac{1}{6\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}5\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}+\frac{1}{20\,d}9\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{4\,d}C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 148: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 213 leaves, 8 steps):

$$-\frac{4\,a^3\,(7\,A+5\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(13\,A+35\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{8\,a^3\,(53\,A+70\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{12\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{35\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,(7\,A+5\,C)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 5, 920 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(-28\,A-25\,C+5\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{40\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{28\,d}+\right.$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(5\,A\,\text{Sin}[c]+21\,A\,\text{Sin}[d\,x])}{140\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(63\,A\,\text{Sin}[c]+130\,A\,\text{Sin}[d\,x]+35\,C\,\text{Sin}[d\,x])}{420\,d}+$$
$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(130\,A\,\text{Sin}[c]+35\,C\,\text{Sin}[c]+294\,A\,\text{Sin}[d\,x]+315\,C\,\text{Sin}[d\,x])}{420\,d}\right)-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$13\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,-$$

$$\frac{1}{6\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}5\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,+\,\frac{1}{20\,d}7\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\left(\left(\mathrm{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\Big]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)+\frac{1}{4\,d}C\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\left(\left(\mathrm{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\Big]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)$$

**Problem 149: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a + a \operatorname{Cos}[c + d x])^3 \left(A + C \operatorname{Cos}[c + d x]^2\right)}{\operatorname{Cos}[c + d x]^{11/2}} \, dx$$

Optimal (type 4, 246 leaves, 9 steps):

$$-\frac{4 a^3 (17 A + 27 C) \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right]}{15 d} + \frac{4 a^3 (11 A + 21 C) \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right]}{21 d} + \frac{8 a^3 (16 A + 21 C) \operatorname{Sin}[c + d x]}{105 d \operatorname{Cos}[c + d x]^{3/2}} + \frac{4 a^3 (17 A + 27 C) \operatorname{Sin}[c + d x]}{15 d \sqrt{\operatorname{Cos}[c + d x]}} + \frac{2 A (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sin}[c + d x]}{9 d \operatorname{Cos}[c + d x]^{9/2}} + \frac{4 A \left(a^2 + a^2 \operatorname{Cos}[c + d x]\right)^2 \operatorname{Sin}[c + d x]}{21 a d \operatorname{Cos}[c + d x]^{7/2}} + \frac{2 (73 A + 63 C) \left(a^3 + a^3 \operatorname{Cos}[c + d x]\right) \operatorname{Sin}[c + d x]}{315 d \operatorname{Cos}[c + d x]^{5/2}}$$

Result (type 5, 955 leaves):

$$\sqrt{\operatorname{Cos}[c + d x]} \, (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \left(\frac{(17 A + 27 C) \operatorname{Csc}[c] \operatorname{Sec}[c]}{30 d} + \frac{A \operatorname{Sec}[c] \operatorname{Sec}[c + d x]^5 \operatorname{Sin}[d x]}{36 d} + \frac{\operatorname{Sec}[c] \operatorname{Sec}[c + d x]^4 (7 A \operatorname{Sin}[c] + 27 A \operatorname{Sin}[d x])}{252 d} + \frac{\operatorname{Sec}[c] \operatorname{Sec}[c + d x]^3 (135 A \operatorname{Sin}[c] + 238 A \operatorname{Sin}[d x] + 63 C \operatorname{Sin}[d x])}{1260 d} + \frac{\operatorname{Sec}[c] \operatorname{Sec}[c + d x]^2 (238 A \operatorname{Sin}[c] + 63 C \operatorname{Sin}[c] + 330 A \operatorname{Sin}[d x] + 315 C \operatorname{Sin}[d x])}{1260 d} + \frac{\operatorname{Sec}[c] \operatorname{Sec}[c + d x] (110 A \operatorname{Sin}[c] + 105 C \operatorname{Sin}[c] + 238 A \operatorname{Sin}[d x] + 378 C \operatorname{Sin}[d x])}{420 d}\right) - \frac{1}{42 d \sqrt{1 + \operatorname{Cot}[c]^2}} 11 A (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Csc}[c] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1 - \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1 + \operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1 + \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} - \frac{1}{2 d \sqrt{1 + \operatorname{Cot}[c]^2}} C (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Csc}[c] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1 - \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1 + \operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1 + \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} + \frac{1}{60 d} 17 A (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Csc}[c] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}9\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 150: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 4, 279 leaves, 10 steps) :

$$-\frac{4\,a^3\,(5\,A+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^3\,(105\,A+143\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{231\,d}+$$
$$\frac{8\,a^3\,(35\,A+44\,C)\,\text{Sin}[c+d\,x]}{385\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{4\,a^3\,(105\,A+143\,C)\,\text{Sin}[c+d\,x]}{231\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^3\,(5\,A+7\,C)\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{11\,d\,\text{Cos}[c+d\,x]^{11/2}}+\frac{4\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{33\,a\,d\,\text{Cos}[c+d\,x]^{9/2}}+\frac{2\,(35\,A+33\,C)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{231\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 5, 997 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(\frac{(5\,A+7\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{10\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^6\,\text{Sin}[d\,x]}{44\,d}+\right.$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^5\,(3\,A\,\text{Sin}[c]+11\,A\,\text{Sin}[d\,x])}{132\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,(77\,A\,\text{Sin}[c]+126\,A\,\text{Sin}[d\,x]+33\,C\,\text{Sin}[d\,x])}{924\,d}+$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(630\,A\,\text{Sin}[c]+165\,C\,\text{Sin}[c]+770\,A\,\text{Sin}[d\,x]+693\,C\,\text{Sin}[d\,x])}{4620\,d}+$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(770\,A\,\text{Sin}[c]+693\,C\,\text{Sin}[c]+1050\,A\,\text{Sin}[d\,x]+1430\,C\,\text{Sin}[d\,x])}{4620\,d}+$$
$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(525\,A\,\text{Sin}[c]+715\,C\,\text{Sin}[c]+1155\,A\,\text{Sin}[d\,x]+1617\,C\,\text{Sin}[d\,x])}{2310\,d}\right)-$$
$$\frac{1}{22\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$13\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{4\,d}A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},\,-\frac{1}{4}\right\},\,\left\{\frac{3}{4}\right\},\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}7\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 151: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 192 leaves, 7 steps):

$$-\frac{3\,(5\,A+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a\,d}+\frac{5\,(7\,A+9\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,a\,d}+\frac{5\,(7\,A+9\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,a\,d}-$$
$$\frac{(5\,A+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}+\frac{(7\,A+9\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,a\,d}-\frac{(A+C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1219 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\left(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-$$

$$\frac{1}{20 (a+a \operatorname{Cos}[c+d x])} 21 i C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\left(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\right)+\frac{1}{a+a \operatorname{Cos}[c+d x]}$$

$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sqrt{\operatorname{Cos}[c+d x]} \left(\frac{2 (5 A+5 C+10 A \operatorname{Cos}[c]+16 C \operatorname{Cos}[c]) \operatorname{Csc}[c]}{5 d}+\frac{(28 A+51 C) \operatorname{Cos}[d x] \operatorname{Sin}[c]}{21 d}-\right.$$

$$\frac{2 C \operatorname{Cos}[2 d x] \operatorname{Sin}[2 c]}{5 d}+\frac{C \operatorname{Cos}[3 d x] \operatorname{Sin}[3 c]}{7 d}+\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \left(A \operatorname{Sin}\left[\frac{d x}{2}\right]+C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{d}+$$

$$\left.\frac{(28 A+51 C) \operatorname{Cos}[c] \operatorname{Sin}[d x]}{21 d}-\frac{2 C \operatorname{Cos}[2 c] \operatorname{Sin}[2 d x]}{5 d}+\frac{C \operatorname{Cos}[3 c] \operatorname{Sin}[3 d x]}{7 d}\right)-$$

$$\left(5 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right]\right.$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\left.\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right) \Big/ \left(3 d (a+a \operatorname{Cos}[c+d x]) \sqrt{1+\operatorname{Cot}[c]^2}\right)-$$

$$\left(15 C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right]\right.$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(7\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 152: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 159 leaves, 6 steps):

$$\frac{3\,(5\,A+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,a\,d}-\frac{(3\,A+5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a\,d}-\frac{(3\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{3\,a\,d}+\frac{(5\,A+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}-\frac{(A+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1170 leaves):

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+\frac{1}{20\,(a+a\,\text{Cos}[c+d\,x])}21\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+\frac{1}{a+a\,\text{Cos}[c+d\,x]}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\sqrt{\text{Cos}[c+d\,x]}\,\left(-\frac{2\,(5\,A+5\,C+10\,A\,\text{Cos}[c]+16\,C\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}-\frac{4\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{2\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{5\,d}-\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}-\frac{4\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{2\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{5\,d}\Bigg)+$$

$$\Bigg(A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+\Bigg(5\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 153: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 122 leaves, 5 steps):

$$-\frac{(A+3\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{(3\,A+5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+$$

$$\frac{(3\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d}-\frac{(A+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1126 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\Bigg)\Bigg/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Bigg/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Bigg/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)+$$

$$\frac{1}{a+a\,\text{Cos}[c+d\,x]}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\text{Cos}[c+d\,x]}\left(\frac{2\,(A+C+2\,C\,\text{Cos}[c])\,\text{Csc}[c]}{d}+\frac{4\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{4\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}\right)-$$

$$\left(A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Bigg/\left(d\,(a+a\,\text{Cos}[c+d\,x])\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(5\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Bigg/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 154: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 83 leaves, 4 steps):

$$\frac{(A+3C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a d}+\frac{(A-C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{a d}-\frac{(A+C)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{d\,(a+a\,\text{Cos}[c+d x])}$$

Result (type 5, 1095 leaves) :

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d x])}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)+\frac{1}{4\,(a+a\,\text{Cos}[c+d x])}3\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)+$$
$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\text{Cos}[c+d x]}\left(-\frac{2\,(A+C+2\,C\,\text{Cos}[c])\,\text{Csc}[c]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}\right)}{a+a\,\text{Cos}[c+d x]}-$$
$$\left(A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$
$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)+$$
$$\left(C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 155: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 113 leaves, 5 steps):

$$-\frac{(3\,A+C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}-\frac{(A-C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}+\frac{(3\,A+C)\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1128 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+$$
$$\frac{1}{a+a\,\text{Cos}[c+d\,x]}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\text{Cos}[c+d\,x]}\left(\frac{(2\,A+A\,\text{Cos}[c]+C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}+\right.$$

$$\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{d}\Bigg)+$$

$$\left(A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\,\sqrt{1+\mathrm{Cot}[c]^2}\right)-$$

$$\left(C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\,\sqrt{1+\mathrm{Cot}[c]^2}\right)$$

- **Problem 156: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 150 leaves, 6 steps):

$$\frac{(3\,A+C)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{(5\,A+3\,C)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+$$

$$\frac{(5\,A+3\,C)\,\mathrm{Sin}[c+d\,x]}{3\,a\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}-\frac{(3\,A+C)\,\mathrm{Sin}[c+d\,x]}{a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{(A+C)\,\mathrm{Sin}[c+d\,x]}{d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 5, 1163 leaves):

$$\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}3\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\text{Cos}[2 c]+i e^{2 i d x}\text{Sin}[2 c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+\frac{1}{4\,(a+a\,\text{Cos}[c+d x])}\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2 e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\text{Cos}[2 c]+i e^{2 i d x}\text{Sin}[2 c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\text{Cos}[2 c]+i e^{2 i d x}\text{Sin}[2 c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+\frac{1}{a+a\,\text{Cos}[c+d x]}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\text{Cos}[c+d x]}\left(-\frac{(2 A+A\,\text{Cos}[c]+C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{4 A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{3 d}+\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d x]\,(A\,\text{Sin}[c]-3 A\,\text{Sin}[d x])}{3 d}\right)-$$

$$\left(5 A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3 d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)-\left(C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$

$$\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 157: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{7/2}\,(a+a\,\text{Cos}[c+d x])}\,dx$$

Optimal (type 4, 192 leaves, 7 steps):

$$-\frac{3\,(7\,A+5\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,a\,d}-\frac{(5\,A+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a\,d}+$$

$$\frac{(7\,A+5\,C)\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}-\frac{(5\,A+3\,C)\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{3\,(7\,A+5\,C)\,\text{Sin}[c+d\,x]}{5\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{d\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1207 leaves):

$$-\frac{1}{20\,(a+a\,\text{Cos}[c+d\,x])}21\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\Big(\Big(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Big)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\Big(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Big)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\Big)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\Big(\Big(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Big)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\Big(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Big)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\Big)+$$

$$\frac{1}{a+a\,\text{Cos}[c+d\,x]}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\sqrt{\text{Cos}[c+d\,x]}\,\Big(\frac{(16\,A+10\,C+5\,A\,\text{Cos}[c]+5\,C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]}{5\,d}+$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{4\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{5\,d}+$$

$$\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,A\,\text{Sin}[c]-5\,A\,\text{Sin}[d\,x])}{15\,d}-\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(5\,A\,\text{Sin}[c]-24\,A\,\text{Sin}[d\,x]-15\,C\,\text{Sin}[d\,x])}{15\,d}\Big)+$$

$$\Big(5\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 158: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 196 leaves, 7 steps) :

$$\frac{4\,(5\,A+14\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a^2\,d}-\frac{5\,(A+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a^2\,d}-\frac{5\,(A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,d}+$$
$$\frac{4\,(5\,A+14\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a^2\,d}-\frac{(A+3\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A+C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1248 leaves) :

$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+\frac{1}{5\,(a+a\,\text{Cos}[c+d\,x])^2}28\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)+$$

$$\left(10\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(10\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{8\,(5\,A+10\,C+5\,A\,\text{Cos}[c]+18\,C\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}-\frac{16\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{4\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{5\,d}+\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{8\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+2\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}-$$

$$\left.\frac{16\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{4\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{5\,d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 159: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 161 leaves, 6 steps):

$$-\frac{(A+7C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}+\frac{2(A+5C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3a^2 d}+$$
$$\frac{2(A+5C)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3a^2 d}-\frac{(A+7C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3a^2 d\,(1+\text{Cos}[c+d x])}-\frac{(A+C)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{3d\,(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 1209 leaves):

$$-\frac{1}{2(a+a\,\text{Cos}[c+d x])^2}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-\frac{1}{2(a+a\,\text{Cos}[c+d x])^2}7\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-$$
$$\left(4A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(20\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\operatorname{Sin}[d\,x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\ \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2}\ \operatorname{Sin}[c]\ \operatorname{Sin}[d\,x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\ \sqrt{1+\operatorname{Sin}[d\,x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg)\Bigg/$$

$$\left(3\,d\,(a+a\operatorname{Cos}[c+d\,x])^2\sqrt{1+\operatorname{Cot}[c]^2}\right)+\frac{1}{(a+a\operatorname{Cos}[c+d\,x])^2}\operatorname{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\operatorname{Cos}[c+d\,x]}$$

$$\left(\frac{4\,(A+3\,C+4\,C\operatorname{Cos}[c])\operatorname{Csc}[c]}{d}+\frac{8\,C\operatorname{Cos}[d\,x]\operatorname{Sin}[c]}{3\,d}-\frac{2\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\operatorname{Sin}\left[\frac{d\,x}{2}\right]+C\operatorname{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\left.\frac{4\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\operatorname{Sin}\left[\frac{d\,x}{2}\right]+3\,C\operatorname{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{8\,C\operatorname{Cos}[c]\operatorname{Sin}[d\,x]}{3\,d}-\frac{2\,(A+C)\operatorname{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\operatorname{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 160: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\operatorname{Cos}[c+d\,x]}\,\left(A+C\operatorname{Cos}[c+d\,x]^2\right)}{(a+a\operatorname{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 126 leaves, 5 steps) :

$$\frac{4\,C\operatorname{EllipticE}\left[\frac{1}{2}(c+d\,x),\,2\right]}{a^2\,d}+\frac{(A-5\,C)\operatorname{EllipticF}\left[\frac{1}{2}(c+d\,x),\,2\right]}{3\,a^2\,d}+\frac{(A-5\,C)\sqrt{\operatorname{Cos}[c+d\,x]}\operatorname{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\operatorname{Cos}[c+d\,x])}-\frac{(A+C)\operatorname{Cos}[c+d\,x]^{3/2}\operatorname{Sin}[c+d\,x]}{3\,d\,(a+a\operatorname{Cos}[c+d\,x])^2}$$

Result (type 5, 814 leaves) :

$$\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}2\,\mathrm{i}\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)-$$

$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)\right)-$$

$$\left(2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\sqrt{1+\mathrm{Cot}[c]^2}\right)+$$

$$\left(10\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\sqrt{1+\mathrm{Cot}[c]^2}\right)+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\left(-\frac{8\,C\,\mathrm{Cot}\left[\frac{c}{2}\right]}{d}-\frac{8\,C\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d}+\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{2\,(A+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 161: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d\,x]^2}{\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 125 leaves, 5 steps):

$$\frac{(A-C)\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}+\frac{2\,(A+C)\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a^2\,d}-\frac{(A-C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A+C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 5, 1176 leaves):

$$\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}\,\mathrm{i}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,\mathrm{i}\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,\mathrm{i}\,d\,x}\,(\text{Cos}[c]+\mathrm{i}\,\text{Sin}[c])^2\right]\,\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\text{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\,\left(3\,\mathrm{i}\,d\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,\mathrm{i}\,d\,x}\,(\text{Cos}[c]+\mathrm{i}\,\text{Sin}[c])^2\right]\,\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\text{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\,\left(-\mathrm{i}\,d\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}\,\mathrm{i}\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,\mathrm{i}\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,\mathrm{i}\,d\,x}\,(\text{Cos}[c]+\mathrm{i}\,\text{Sin}[c])^2\right]\,\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\text{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\,\left(3\,\mathrm{i}\,d\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,\mathrm{i}\,d\,x}\,(\text{Cos}[c]+\mathrm{i}\,\text{Sin}[c])^2\right]\,\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\text{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\,\left(-\mathrm{i}\,d\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)\right)-$$
$$\left(4\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\,\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(4\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(A-C)\,\text{Csc}[c]}{d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}-\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 162: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 155 leaves, 6 steps):

$$-\frac{4\,A\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a^2\,d}-\frac{(5\,A-C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a^2\,d}+$$
$$\frac{4\,A\,\text{Sin}[c+d\,x]}{a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{(5\,A-C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 834 leaves):

$$-\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+$$

$$\left(10\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{8\,A\,\text{Cot}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}+\frac{8\,A\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{d}+\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{8\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 163: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 189 leaves, 7 steps):

$$\frac{(7 A+C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a^2 d}+\frac{2(5 A+C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{3 a^2 d}+\frac{2(5 A+C)\,\text{Sin}[c+d x]}{3 a^2 d\,\text{Cos}[c+d x]^{3/2}}-$$

$$\frac{(7 A+C)\,\text{Sin}[c+d x]}{a^2 d\sqrt{\text{Cos}[c+d x]}}-\frac{(7 A+C)\,\text{Sin}[c+d x]}{3 a^2 d\,\text{Cos}[c+d x]^{3/2}(1+\text{Cos}[c+d x])}-\frac{(A+C)\,\text{Sin}[c+d x]}{3 d\,\text{Cos}[c+d x]^{3/2}(a+a\,\text{Cos}[c+d x])^2}$$

Result (type 5, 1245 leaves) :

$$\frac{1}{2(a+a\,\text{Cos}[c+d x])^2}7\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2 e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)+\frac{1}{2(a+a\,\text{Cos}[c+d x])^2}i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2 e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-$$

$$\left(20 A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3 d(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(4 C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Bigg/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{2\,(4\,A+3\,A\,\text{Cos}[c]+C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(3\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{8\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}+$$

$$\left.\frac{8\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]-6\,A\,\text{Sin}[d\,x])}{3\,d}-\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 164: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{7/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 250 leaves, 8 steps):

$$\frac{7\,(7\,A+33\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{10\,a^3\,d}-\frac{(13\,A+63\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{6\,a^3\,d}-$$

$$\frac{(13\,A+63\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,a^3\,d}+\frac{7\,(7\,A+33\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{30\,a^3\,d}-$$

$$\frac{(A+C)\,\text{Cos}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,(A+6\,C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(13\,A+63\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1333 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}49\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Bigg/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Bigg/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,231\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+$$

$$\left(26\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(42\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\left(-\frac{4\,(29\,A+99\,C+20\,A\,\text{Cos}[c]+132\,C\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}-\right.$$

$$\frac{16\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{d}+\frac{8\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{5\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+$$

$$\frac{8\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(7\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+12\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(29\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+99\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-$$

$$\left.\frac{16\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}+\frac{8\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{5\,d}+\frac{8\,(7\,A+12\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

**Problem 165: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d x]^{5/2} \left(A+C \text{Cos}[c+d x]^2\right)}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 4, 209 leaves, 7 steps):

$$-\frac{(9 A+119 C) \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{10 a^3 d}+\frac{(A+11 C) \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{2 a^3 d}+\frac{(A+11 C) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{2 a^3 d}-\frac{(A+C) \text{Cos}[c+d x]^{7/2} \text{Sin}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{2 C \text{Cos}[c+d x]^{5/2} \text{Sin}[c+d x]}{3 a d (a+a \text{Cos}[c+d x])^2}-\frac{(9 A+119 C) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{30 d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 5, 1296 leaves):

$$-\frac{1}{10 (a+a \text{Cos}[c+d x])^3} 9 i A \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\text{Cos}[c]+i \text{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x} \text{Cos}[2 c]+i e^{2 i d x} \text{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \text{Cos}[c]-3 d \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)-$$
$$\left(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\text{Cos}[c]+i \text{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x} \text{Cos}[2 c]+i e^{2 i d x} \text{Sin}[2 c]}\right) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \text{Cos}[c]+d \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)\right)-$$
$$\frac{1}{10 (a+a \text{Cos}[c+d x])^3} 119 i C \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\text{Cos}[c]+i \text{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x} \text{Cos}[2 c]+i e^{2 i d x} \text{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \text{Cos}[c]-3 d \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)-$$
$$\left(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\text{Cos}[c]+i \text{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \text{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x} \text{Cos}[2 c]+i e^{2 i d x} \text{Sin}[2 c]}\right) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \text{Cos}[c]+d \left(-1+e^{2 i d x}\right) \text{Sin}[c]\right)\right)-$$
$$\left(2 A \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}\right] \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(22\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{4\,(9\,A+59\,C+60\,C\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}+\frac{16\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(9\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+19\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(9\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+59\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+$$

$$\left.\frac{16\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}-\frac{4\,(9\,A+19\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 166: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 178 leaves, 6 steps):

$$-\frac{(A-49\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(A-13\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}-$$

$$\frac{(A+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{2\,(A-4\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{(A-13\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1271 leaves):

$$-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d x])^3}49\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-$$

$$\left(2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(26\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\sqrt{\text{Cos}[c+d x]}$$

$$\left(-\frac{4\,(-A+29\,C+20\,C\,\text{Cos}[c])\,\text{Csc}[c]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-29\,C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5\,d}+\right.$$

$$\left.\frac{8\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(2\,A\,\text{Sin}\left[\frac{d x}{2}\right]+7\,C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{15\,d}+\frac{8\,(2\,A+7\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

**Problem 167: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Cos}[c+d x]}\,\left(A+C\,\text{Cos}[c+d x]^2\right)}{(a+a\,\text{Cos}[c+d x])^3}\,dx$$

Optimal (type 4, 180 leaves, 6 steps):

$$\frac{(A-9C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{10\,a^3\,d}+\frac{(A+3C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{6\,a^3\,d}-\frac{(A+C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{5\,d\,(a+a\,\text{Cos}[c+d x])^3}+\frac{2\,(2A-3C)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d x])^2}-\frac{(A-9C)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d x]\right)}$$

Result (type 5, 1259 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d x])^3}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-\frac{1}{10\,(a+a\,\text{Cos}[c+d x])^3}\,9\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-$$
$$\left(2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(A-9\,C)\,\text{Csc}[c]}{5\,d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,(A-9\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 168: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 184 leaves, 6 steps):

$$\frac{(9\,A-C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(3\,A+C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}-$$

$$\frac{(A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,(3\,A-2\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(9\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1265 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-\frac{1}{10\,(a+a \operatorname{Cos}[c+d x])^3} i\, C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]\Bigg(\Bigg(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/\left(3 i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\Bigg(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/\left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-$$

$$\Bigg(2 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/\left(d\,(a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)-$$

$$\Bigg(2 C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/$$

$$\left(3 d\,(a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)+\frac{1}{(a+a \operatorname{Cos}[c+d x])^3} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c+d x]}$$

$$\Bigg(-\frac{4\,(9 A-C) \operatorname{Csc}[c]}{5 d}-\frac{8 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(3 A \operatorname{Sin}\left[\frac{d x}{2}\right]-2 C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{15 d}-\frac{4 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(9 A \operatorname{Sin}\left[\frac{d x}{2}\right]-C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-$$

$$\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A \operatorname{Sin}\left[\frac{d x}{2}\right]+C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-\frac{8\,(3 A-2 C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Tan}\left[\frac{c}{2}\right]}{15 d}-\frac{2\,(A+C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Tan}\left[\frac{c}{2}\right]}{5 d}\Bigg)$$

- **Problem 169: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+C \operatorname{Cos}[c+d x]^2}{\operatorname{Cos}[c+d x]^{3/2}\,(a+a \operatorname{Cos}[c+d x])^3}\, dx$$

Optimal (type 4, 219 leaves, 7 steps):

$$-\frac{(49\,A-C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{10\,a^3\,d}-\frac{(13\,A-C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{6\,a^3\,d}+\frac{(49\,A-C)\,\text{Sin}[c+d\,x]}{10\,a^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,(4\,A-C)\,\text{Sin}[c+d\,x]}{15\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(13\,A-C)\,\text{Sin}[c+d\,x]}{6\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1301 leaves) :

$$-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}49\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+$$
$$\left(26\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^3\,\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Bigg/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^3\,\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(\frac{2\,(20\,A+29\,A\,\text{Cos}[c]-C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(29\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(11\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+$$

$$\left.\frac{16\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}+\frac{4\,(11\,A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 170: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 242 leaves, 8 steps):

$$\frac{(119\,A+9\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(11\,A+C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{2\,a^3\,d}+\frac{(11\,A+C)\,\text{Sin}[c+d\,x]}{2\,a^3\,d\,\text{Cos}[c+d\,x]^{3/2}}-\frac{(119\,A+9\,C)\,\text{Sin}[c+d\,x]}{10\,a^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{(A+C)\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,A\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(119\,A+9\,C)\,\text{Sin}[c+d\,x]}{30\,d\,\text{Cos}[c+d\,x]^{3/2}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1331 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}119\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3 i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\left(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d \left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-$$

$$\left(22 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\right.$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\left.\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right) \Big/ \left(d (a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)-$$

$$\left(2 C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right) \Big/$$

$$\left(d (a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)+\frac{1}{(a+a \operatorname{Cos}[c+d x])^3}$$

$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c+d x]} \left(-\frac{2 (60 A+59 A \operatorname{Cos}[c]+9 C \operatorname{Cos}[c]) \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[c]}{5 d}-\right.$$

$$\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(A \operatorname{Sin}\left[\frac{d x}{2}\right]+C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-\frac{8 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(8 A \operatorname{Sin}\left[\frac{d x}{2}\right]+3 C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{15 d}-$$

$$\frac{4 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \left(59 A \operatorname{Sin}\left[\frac{d x}{2}\right]+9 C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}+\frac{16 A \operatorname{Sec}[c] \operatorname{Sec}[c+d x]^2 \operatorname{Sin}[d x]}{3 d}+$$

$$\left.\frac{16 \operatorname{Sec}[c] \operatorname{Sec}[c+d x] (A \operatorname{Sin}[c]-9 A \operatorname{Sin}[d x])}{3 d}-\frac{8 (8 A+3 C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Tan}\left[\frac{c}{2}\right]}{15 d}-\frac{2 (A+C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Tan}\left[\frac{c}{2}\right]}{5 d}\right)$$

- **Problem 171: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \operatorname{Cos}[c+d x]^{3/2} \sqrt{a+a \operatorname{Cos}[c+d x]} \left(A+C \operatorname{Cos}[c+d x]^2\right) dx$$

Optimal (type 3, 214 leaves, 6 steps):

$$\frac{\sqrt{a}\ (48A+35C)\ \mathrm{ArcSin}\left[\frac{\sqrt{a}\ \mathrm{Sin}[c+d x]}{\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]}{64 d}+\frac{a\ (48A+35C)\ \sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Sin}[c+d x]}{64 d \sqrt{a+a\,\mathrm{Cos}[c+d x]}}+$$

$$\frac{a\ (48A+35C)\ \mathrm{Cos}[c+d x]^{3/2}\ \mathrm{Sin}[c+d x]}{96 d \sqrt{a+a\,\mathrm{Cos}[c+d x]}}+\frac{a\,C\,\mathrm{Cos}[c+d x]^{5/2}\ \mathrm{Sin}[c+d x]}{24 d \sqrt{a+a\,\mathrm{Cos}[c+d x]}}+\frac{C\,\mathrm{Cos}[c+d x]^{5/2}\ \sqrt{a+a\,\mathrm{Cos}[c+d x]}\ \mathrm{Sin}[c+d x]}{4 d}$$

Result (type 3, 991 leaves):

$$\frac{1}{128}\ (48A+35C)\ \sqrt{a\ (1+\mathrm{Cos}[c+d x])}\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]$$
$$\left(\frac{1}{2}\ i\ \mathrm{Sin}\left[\frac{c}{2}\right]\ \left(-\left(2\ i\ e^{\frac{i d x}{2}}\ \mathrm{Log}\left[2\ \left(e^{i d x}\ \mathrm{Cos}\left[\frac{c}{2}\right]+i\ e^{i d x}\ \mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right)\right]\ \left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\ \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i d x}\ \left(\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]\right)}\right)\Big/\left(d\ \sqrt{2\ \left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+2\ i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right)-$$
$$\left(2\ i\ e^{\frac{i d x}{2}}\ \mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\ \mathrm{Sin}\left[\frac{c}{2}\right]\right)\ \sqrt{\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right]\ \left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\ \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-i d x}\ \left(\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]\right)}\right)\Big/\left(d\ \sqrt{2\ \left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+2\ i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\ \mathrm{Cos}\left[\frac{c}{2}\right]\ \left(-\left(2\ i\ e^{\frac{i d x}{2}}\ \mathrm{Log}\left[2\ \left(e^{i d x}\ \mathrm{Cos}\left[\frac{c}{2}\right]+i\ e^{i d x}\ \mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right)\right]\ \left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\ \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-i d x}\ \left(\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]\right)}\right)\Big/\left(d\ \sqrt{2\ \left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+2\ i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right)+$$
$$\left(2\ i\ e^{\frac{i d x}{2}}\ \mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\ \mathrm{Sin}\left[\frac{c}{2}\right]\right)\ \sqrt{\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right]\ \left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\ \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-i d x}\ \left(\left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]\right)}\right)\Big/\left(d\ \sqrt{2\ \left(1+e^{2 i d x}\right)\ \mathrm{Cos}[c]+2\ i\ \left(-1+e^{2 i d x}\right)\ \mathrm{Sin}[c]}\right)\right)\right)+$$
$$\sqrt{\mathrm{Cos}[c+d x]}\ \sqrt{a\ (1+\mathrm{Cos}[c+d x])}\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\ \left(\frac{(6A+5C)\ \mathrm{Cos}\left[\frac{d x}{2}\right]\ \mathrm{Sin}\left[\frac{c}{2}\right]}{12 d}+\frac{(16A+13C)\ \mathrm{Cos}\left[\frac{3 d x}{2}\right]\ \mathrm{Sin}\left[\frac{3 c}{2}\right]}{64 d}+\right.$$
$$\frac{C\,\mathrm{Cos}\left[\frac{5 d x}{2}\right]\ \mathrm{Sin}\left[\frac{5 c}{2}\right]}{24 d}+\frac{C\,\mathrm{Cos}\left[\frac{7 d x}{2}\right]\ \mathrm{Sin}\left[\frac{7 c}{2}\right]}{32 d}+$$
$$\frac{(6A+5C)\ \mathrm{Cos}\left[\frac{c}{2}\right]\ \mathrm{Sin}\left[\frac{d x}{2}\right]}{12 d}+\frac{(16A+13C)\ \mathrm{Cos}\left[\frac{3 c}{2}\right]\ \mathrm{Sin}\left[\frac{3 d x}{2}\right]}{64 d}+$$
$$\left.\frac{C\,\mathrm{Cos}\left[\frac{5 c}{2}\right]\ \mathrm{Sin}\left[\frac{5 d x}{2}\right]}{24 d}+\frac{C\,\mathrm{Cos}\left[\frac{7 c}{2}\right]\ \mathrm{Sin}\left[\frac{7 d x}{2}\right]}{32 d}\right)$$

- **Problem 172: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\mathrm{Cos}[c+d x]}\ \sqrt{a+a\,\mathrm{Cos}[c+d x]}\ \left(A+C\,\mathrm{Cos}[c+d x]^2\right)\,dx$$

Optimal (type 3, 169 leaves, 5 steps):

$$\frac{\sqrt{a}\ (8 A+5 C)\ \text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{8 d}+\frac{a\ (8 A+5 C)\ \sqrt{\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{8 d \sqrt{a+a \text{Cos}[c+d x]}}+$$
$$\frac{a C \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{12 d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{C \text{Cos}[c+d x]^{3/2} \sqrt{a+a \text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{3 d}$$

Result (type 3, 578 leaves):

$$\frac{1}{48 d \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}} \sqrt{\text{Cos}[c+d x]}\ \sqrt{a\ (1+\text{Cos}[c+d x])}\ \text{Sec}\left[\frac{1}{2}\ (c+d x)\right]$$
$$\left(-3 i\ (8 A+5 C)\ \text{Cos}\left[\frac{d x}{2}\right] \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right]+\right.$$
$$3 i\ (8 A+5 C)\ \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i \text{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right] \left(\text{Cos}\left[\frac{d x}{2}\right]+i \text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$24 A \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[\frac{d x}{2}\right]+$$
$$15 C \text{Log}\left[2 \left(e^{i d x} \text{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \text{Cos}[c]+i \left(-1+e^{2 i d x}\right) \text{Sin}[c]}\right)\right] \text{Sin}\left[\frac{d x}{2}\right]+$$
$$48 \sqrt{2}\ A \sqrt{\text{Cos}[c+d x]\ (\text{Cos}[d x]+i \text{Sin}[d x])}\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]+28 \sqrt{2}\ C \sqrt{\text{Cos}[c+d x]\ (\text{Cos}[d x]+i \text{Sin}[d x])}\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]+$$
$$\left.6 \sqrt{2}\ C \sqrt{\text{Cos}[c+d x]\ (\text{Cos}[d x]+i \text{Sin}[d x])}\ \text{Sin}\left[\frac{3}{2}\ (c+d x)\right]+4 \sqrt{2}\ C \sqrt{\text{Cos}[c+d x]\ (\text{Cos}[d x]+i \text{Sin}[d x])}\ \text{Sin}\left[\frac{5}{2}\ (c+d x)\right]\right)$$

- **Problem 173: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+a \text{Cos}[c+d x]}\ \left(A+C \text{Cos}[c+d x]^2\right)}{\sqrt{\text{Cos}[c+d x]}}\, dx$$

Optimal (type 3, 124 leaves, 4 steps):

$$\frac{\sqrt{a}\ (8 A+3 C)\ \text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right]}{4 d}+\frac{a C \sqrt{\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{4 d \sqrt{a+a \text{Cos}[c+d x]}}+\frac{C \sqrt{\text{Cos}[c+d x]}\ \sqrt{a+a \text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{2 d}$$

Result (type 3, 494 leaves):

$$\frac{1}{8\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-i\,(8\,A+3\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$i\,(8\,A+3\,C)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right]\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$8\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$3\,C\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.4\,\sqrt{2}\,C\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,\sqrt{2}\,C\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)$$

- **Problem 174: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 117 leaves, 4 steps) :

$$\frac{\sqrt{a}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}-\frac{a\,(2\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 615 leaves) :

$$\frac{1}{4\sqrt{2}\,d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}$$
$$\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(-i\,C\,\text{Cos}\left[c+\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]-\right.$$
$$i\,C\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+$$
$$2\,i\,C\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\text{Cos}[c+d\,x]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)-$$
$$C\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[c+\frac{d\,x}{2}\right]+$$
$$8\sqrt{2}\,A\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]-$$
$$2\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+$$
$$\left.C\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 175: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 116 leaves, 4 steps):

$$\frac{2\sqrt{a}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{3\,d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 3, 468 leaves):

$$\frac{1}{6\sqrt{2}\, d\, \text{Cos}[c+d x]^{3/2}\sqrt{\text{Cos}[c+d x]}\, (\text{Cos}[d x]+i\, \text{Sin}[d x])}\, i\sqrt{a\,(1+\text{Cos}[c+d x])}\, \text{Sec}\left[\frac{1}{2}(c+d x)\right]$$
$$\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)\left(6\, C\, \text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\text{Cos}[c+d x]^2-\right.$$
$$3\, C\, \text{Cos}[2\,(c+d x)]\, \text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]-$$
$$\left(\text{Cos}\left[\frac{d x}{2}\right]-i\,\text{Sin}\left[\frac{d x}{2}\right]\right)\left(3\, C\, \text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\, i\, C\, \text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$\left.\left.4\, i\sqrt{2}\, A\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{3}{2}(c+d x)\right]\right)\right)$$

- **Problem 179: Result unnecessarily involves imaginary or complex numbers.**

$$\int \text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^{3/2}\left(A+C\,\text{Cos}[c+d x]^2\right)dx$$

Optimal (type 3, 265 leaves, 7 steps):

$$\frac{a^{3/2}\,(176 A+133 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{128\, d}+\frac{a^2\,(176 A+133 C)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{128\, d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$
$$\frac{a^2\,(176 A+133 C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{192\, d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a^2\,(80 A+67 C)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{240\, d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$
$$\frac{3\, a\, C\,\text{Cos}[c+d x]^{5/2}\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{40\, d}+\frac{C\,\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{5\, d}$$

Result (type 3, 367 leaves):

$$-\frac{1}{7680\, d\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\, i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3$$
$$\left(-15\, i\,(176 A+133 C)\, e^{\frac{i d x}{2}}\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]-\right.\right.$$
$$\left.\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}-4\sqrt{\text{Cos}[c+d x]}\,(2960 A+2671 C+2\,(880 A+1007 C)\,\text{Cos}[c+d x]+$$
$$\left.4\,(80 A+181 C)\,\text{Cos}[2\,(c+d x)]+228\, C\,\text{Cos}[3\,(c+d x)]+48\, C\,\text{Cos}[4\,(c+d x)])\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 180: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 3, 218 leaves, 6 steps):

$$\frac{a^{3/2}\,(112\,A+75\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{a^2\,(112\,A+75\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{64\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,(16\,A+13\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{32\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a\,C\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{8\,d}+\frac{C\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 3, 995 leaves):

$$\frac{1}{256}(112\,A+75\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3$$
$$\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)\right)+$$
$$\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\frac{(3\,A+2\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{4\,d}+\frac{(16\,A+21\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{128\,d}+\right.$$
$$\frac{C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\text{Sin}\left[\frac{5\,c}{2}\right]}{16\,d}+\frac{C\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\text{Sin}\left[\frac{7\,c}{2}\right]}{64\,d}+$$
$$\frac{(3\,A+2\,C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+\frac{(16\,A+21\,C)\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{128\,d}+$$
$$\left.\frac{C\,\text{Cos}\left[\frac{5\,c}{2}\right]\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{16\,d}+\frac{C\,\text{Cos}\left[\frac{7\,c}{2}\right]\text{Sin}\left[\frac{7\,d\,x}{2}\right]}{64\,d}\right)$$

- **Problem 181: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 171 leaves, 5 steps):

$$\frac{a^{3/2}\,(24\,A+11\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a^2\,(24\,A+19\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 579 leaves) :

$$\frac{1}{48\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,a\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-3\,i\,(24\,A+11\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,(24\,A+11\,C)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$72\,A\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$33\,C\,\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$48\,\sqrt{2}\,A\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+52\,\sqrt{2}\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$\left.18\,\sqrt{2}\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\,\sqrt{2}\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

- **Problem 182: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 175 leaves, 5 steps) :

$$\frac{a^{3/2}\,(8\,A+7\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{a^2\,(8\,A-5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$
$$\frac{a\,(4\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 911 leaves) :

$$\frac{1}{16}(8A+7C)\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3$$
$$\left(\frac{1}{2}\,\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,\mathrm{i}\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,\mathrm{i}\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)\right)+$$
$$\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\frac{3\,C\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{4\,d}+\frac{C\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{8\,d}+\right.$$
$$\frac{3\,C\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{4\,d}+\frac{C\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{8\,d}+$$
$$\left.\frac{A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d}\right)$$

- **Problem 183: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 161 leaves, 5 steps):

$$\frac{3\,a^{3/2}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}-\frac{a^2\,(8\,A-3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,a\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 3, 895 leaves):

$$\frac{3}{4} C (a (1+\mathrm{Cos}[c+d x]))^{3/2} \mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3$$

$$\left(\frac{1}{2} i \,\mathrm{Sin}\left[\frac{c}{2}\right] \left(-\left(2 i e^{\frac{i d x}{2}} \mathrm{Log}\left[2 \left(e^{i d x} \mathrm{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right)\right] \left(\mathrm{Cos}\left[\frac{c}{2}\right]-i \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i d x} ((1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c])}\right) \Big/ \left(d \sqrt{2 (1+e^{2 i d x}) \mathrm{Cos}[c]+2 i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right) -$$

$$\left(2 i e^{\frac{i d x}{2}} \mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i \mathrm{Sin}\left[\frac{c}{2}\right]\right) \sqrt{(1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right] \left(\mathrm{Cos}\left[\frac{c}{2}\right]+i \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x} ((1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c])}\right) \Big/ \left(d \sqrt{2 (1+e^{2 i d x}) \mathrm{Cos}[c]+2 i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right)\right) +$$

$$\frac{1}{2} \mathrm{Cos}\left[\frac{c}{2}\right] \left(-\left(2 i e^{\frac{i d x}{2}} \mathrm{Log}\left[2 \left(e^{i d x} \mathrm{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right)\right] \left(\mathrm{Cos}\left[\frac{c}{2}\right]-i \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i d x} ((1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c])}\right) \Big/ \left(d \sqrt{2 (1+e^{2 i d x}) \mathrm{Cos}[c]+2 i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right) +$$

$$\left(2 i e^{\frac{i d x}{2}} \mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i \mathrm{Sin}\left[\frac{c}{2}\right]\right) \sqrt{(1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right] \left(\mathrm{Cos}\left[\frac{c}{2}\right]+i \mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i d x} ((1+e^{2 i d x}) \mathrm{Cos}[c]+i (-1+e^{2 i d x}) \mathrm{Sin}[c])}\right) \Big/ \left(d \sqrt{2 (1+e^{2 i d x}) \mathrm{Cos}[c]+2 i (-1+e^{2 i d x}) \mathrm{Sin}[c]}\right)\right)\right) +$$

$$\sqrt{\mathrm{Cos}[c+d x]} (a (1+\mathrm{Cos}[c+d x]))^{3/2} \mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \left(\frac{C \mathrm{Cos}\left[\frac{d x}{2}\right] \mathrm{Sin}\left[\frac{c}{2}\right]}{2 d}+\frac{C \mathrm{Cos}\left[\frac{c}{2}\right] \mathrm{Sin}\left[\frac{d x}{2}\right]}{2 d}+\right.$$

$$\left.\frac{5 A \mathrm{Sec}[c+d x] \mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}+\frac{A \mathrm{Sec}[c+d x]^2 \mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{3 d}\right)$$

- **Problem 184: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a \mathrm{Cos}[c+d x])^{3/2} \left(A+C \mathrm{Cos}[c+d x]^2\right)}{\mathrm{Cos}[c+d x]^{7/2}} \, dx$$

Optimal (type 3, 163 leaves, 5 steps):

$$\frac{2 a^{3/2} C \mathrm{ArcSin}\left[\frac{\sqrt{a} \mathrm{Sin}[c+d x]}{\sqrt{a+a \mathrm{Cos}[c+d x]}}\right]}{d}+\frac{2 a^2 (4 A+5 C) \mathrm{Sin}[c+d x]}{5 d \sqrt{\mathrm{Cos}[c+d x]} \sqrt{a+a \mathrm{Cos}[c+d x]}}+$$

$$\frac{2 a A \sqrt{a+a \mathrm{Cos}[c+d x]} \mathrm{Sin}[c+d x]}{5 d \mathrm{Cos}[c+d x]^{3/2}}+\frac{2 A (a+a \mathrm{Cos}[c+d x])^{3/2} \mathrm{Sin}[c+d x]}{5 d \mathrm{Cos}[c+d x]^{5/2}}$$

Result (type 3, 747 leaves):

$$\frac{1}{20\sqrt{2}\, d\, \text{Cos}[c+d x]^{5/2}\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}}\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3$$
$$\left(\frac{5}{4} C\, e^{-\frac{5}{2} i d x}\,\text{Cos}\left[\frac{c}{2}\right]^2 \text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\right.$$
$$\left(i\left(1+e^{2 i d x}\right)\text{Cos}[c]-\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+\frac{5}{4} C\, e^{-\frac{5}{2} i d x}\,\text{Log}\Big[$$
$$2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\Big]\,\text{Sin}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right)\text{Cos}[c]-\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+$$
$$\frac{5}{4} i\, C\, e^{-\frac{5}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\text{Cos}\left[\frac{c}{2}\right]^2$$
$$\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+\frac{5}{4} i\, C\, e^{-\frac{5}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]$$
$$\text{Sin}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+4 A\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$
$$12 A\,\text{Cos}[c+d x]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$
$$24\sqrt{2}\, A\,\text{Cos}[c+d x]^2\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$
$$\left.20\sqrt{2}\, C\,\text{Cos}[c+d x]^2\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 188: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^{5/2}\left(A+C\,\text{Cos}[c+d x]^2\right)dx$$

Optimal (type 3, 312 leaves, 8 steps):

$$\frac{a^{5/2}\,(1304 A+1015 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{512 d}+\frac{a^3\,(1304 A+1015 C)\sqrt{\text{Cos}[c+d x]}\;\text{Sin}[c+d x]}{512 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a^3\,(1304 A+1015 C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{768 d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$
$$\frac{a^3\,(136 A+109 C)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{192 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a^2\,(24 A+23 C)\,\text{Cos}[c+d x]^{5/2}\sqrt{a+a\,\text{Cos}[c+d x]}\;\text{Sin}[c+d x]}{96 d}+$$
$$\frac{a\, C\,\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{12 d}+\frac{C\,\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^{5/2}\,\text{Sin}[c+d x]}{6 d}$$

Result (type 3, 1103 leaves):

$$\frac{1}{4096}(1304 A+1015 C)\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5$$
$$\left(\frac{1}{2} i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2 i\, e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\right.\right.$$

$$\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)-$$

$$\left(2 i e^{\frac{i d x}{2}}\operatorname{ArcTanh}\left[\left(\operatorname{Cos}\left[\frac{c}{2}\right]+i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right]\left(\operatorname{Cos}\left[\frac{c}{2}\right]+i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\operatorname{Cos}\left[\frac{c}{2}\right]\left(-\left(2 i e^{\frac{i d x}{2}}\operatorname{Log}\left[2\left(e^{i d x}\operatorname{Cos}\left[\frac{c}{2}\right]+i e^{i d x}\operatorname{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right]\left(\operatorname{Cos}\left[\frac{c}{2}\right]-i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)+$$

$$\left(2 i e^{\frac{i d x}{2}}\operatorname{ArcTanh}\left[\left(\operatorname{Cos}\left[\frac{c}{2}\right]+i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right]\left(\operatorname{Cos}\left[\frac{c}{2}\right]+i\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\operatorname{Cos}[c+d x]}\,(a(1+\operatorname{Cos}[c+d x]))^{5/2}\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(\frac{(200 A+161 C)\operatorname{Cos}\left[\frac{d x}{2}\right]\operatorname{Sin}\left[\frac{c}{2}\right]}{384 d}+\right.$$

$$\frac{(360 A+329 C)\operatorname{Cos}\left[\frac{3 d x}{2}\right]\operatorname{Sin}\left[\frac{3 c}{2}\right]}{2048 d}+$$

$$\frac{(10 A+13 C)\operatorname{Cos}\left[\frac{5 d x}{2}\right]\operatorname{Sin}\left[\frac{5 c}{2}\right]}{192 d}+$$

$$\frac{(24 A+79 C)\operatorname{Cos}\left[\frac{7 d x}{2}\right]\operatorname{Sin}\left[\frac{7 c}{2}\right]}{3072 d}+$$

$$\frac{C\operatorname{Cos}\left[\frac{9 d x}{2}\right]\operatorname{Sin}\left[\frac{9 c}{2}\right]}{128 d}+$$

$$\frac{C\operatorname{Cos}\left[\frac{11 d x}{2}\right]\operatorname{Sin}\left[\frac{11 c}{2}\right]}{768 d}+$$

$$\frac{(200 A+161 C)\operatorname{Cos}\left[\frac{c}{2}\right]\operatorname{Sin}\left[\frac{d x}{2}\right]}{384 d}+$$

$$\frac{(360 A+329 C)\operatorname{Cos}\left[\frac{3 c}{2}\right]\operatorname{Sin}\left[\frac{3 d x}{2}\right]}{2048 d}+$$

$$\frac{(10 A+13 C)\operatorname{Cos}\left[\frac{5 c}{2}\right]\operatorname{Sin}\left[\frac{5 d x}{2}\right]}{192 d}+$$

$$\frac{(24 A+79 C)\operatorname{Cos}\left[\frac{7 c}{2}\right]\operatorname{Sin}\left[\frac{7 d x}{2}\right]}{3072 d}+$$

$$\left.\frac{C\,\mathrm{Cos}\left[\frac{9c}{2}\right]\,\mathrm{Sin}\left[\frac{9dx}{2}\right]}{128\,d}+\frac{C\,\mathrm{Cos}\left[\frac{11c}{2}\right]\,\mathrm{Sin}\left[\frac{11dx}{2}\right]}{768\,d}\right)$$

- **Problem 189: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^{5/2}\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 3, 265 leaves, 7 steps) :

$$\frac{a^{5/2}\,(400\,A+283\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{128\,d}+\frac{a^3\,(400\,A+283\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{128\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a^3\,(1040\,A+787\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{960\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,(80\,A+79\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{240\,d}+$$
$$\frac{a\,C\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{8\,d}+\frac{C\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}$$

Result (type 3, 366 leaves) :

$$-\frac{1}{15\,360\,d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}}\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{5/2}\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5$$
$$\left(-15\,i\,(400\,A+283\,C)\,e^{\frac{i\,d\,x}{2}}\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}-4\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(6320\,A+5521\,C+(2720\,A+3874\,C)\,\mathrm{Cos}[c+d\,x]+\right.$$
$$\left.\left.4\,(80\,A+331\,C)\,\mathrm{Cos}[2\,(c+d\,x)]+348\,C\,\mathrm{Cos}[3\,(c+d\,x)]+48\,C\,\mathrm{Cos}[4\,(c+d\,x)]\right)\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 190: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 218 leaves, 6 steps) :

$$\frac{a^{5/2}\,(304\,A+163\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,d}+$$

$$\frac{a^3\,(432\,A+299\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,(16\,A+17\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,d}+$$

$$\frac{5\,a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 3, 995 leaves) :

$$\frac{1}{512}\,(304\,A+163\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5$$

$$\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(\frac{5\,(6\,A+5\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]}{48\,d}+\frac{(16\,A+45\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,\text{Sin}\left[\frac{3\,c}{2}\right]}{256\,d}+\right.$$

$$\frac{5\,C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,\text{Sin}\left[\frac{5\,c}{2}\right]}{96\,d}+\frac{C\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\,\text{Sin}\left[\frac{7\,c}{2}\right]}{128\,d}+$$

$$\frac{5\,(6\,A+5\,C)\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{48\,d}+\frac{(16\,A+45\,C)\,\text{Cos}\left[\frac{3\,c}{2}\right]\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{256\,d}+$$

$$\left.\frac{5\,C\,\text{Cos}\left[\frac{5\,c}{2}\right]\,\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{96\,d}+\frac{C\,\text{Cos}\left[\frac{7\,c}{2}\right]\,\text{Sin}\left[\frac{7\,d\,x}{2}\right]}{128\,d}\right)$$

■ **Problem 191: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a + a \,\text{Cos}[c + d\,x])^{5/2} \left(A + C\,\text{Cos}[c + d\,x]^2\right)}{\text{Cos}[c + d\,x]^{3/2}} \, dx$$

Optimal (type 3, 222 leaves, 6 steps) :

$$\frac{5\,a^{5/2}\,(8\,A + 5\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d} - \frac{a^3\,(24\,A - 49\,C)\,\sqrt{\text{Cos}[c + d\,x]}\,\text{Sin}[c + d\,x]}{24\,d\,\sqrt{a + a\,\text{Cos}[c + d\,x]}} -$$

$$\frac{a^2\,(8\,A - 3\,C)\,\sqrt{\text{Cos}[c + d\,x]}\,\sqrt{a + a\,\text{Cos}[c + d\,x]}\,\text{Sin}[c + d\,x]}{4\,d} -$$

$$\frac{a\,(6\,A - C)\,\sqrt{\text{Cos}[c + d\,x]}\,(a + a\,\text{Cos}[c + d\,x])^{3/2}\,\text{Sin}[c + d\,x]}{3\,d} + \frac{2\,A\,(a + a\,\text{Cos}[c + d\,x])^{5/2}\,\text{Sin}[c + d\,x]}{d\,\sqrt{\text{Cos}[c + d\,x]}}$$

Result (type 3, 968 leaves) :

$$\frac{5}{64}\,(8\,A+5\,C)\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5$$

$$\Bigg(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\Bigg(-\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)-$$

$$\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\Bigg)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\Bigg(-\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$

$$\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\Bigg)\Bigg/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\Bigg)\Bigg)+$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(\frac{(12\,A+31\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{48\,d}+\frac{5\,C\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{32\,d}+\right.$$

$$\frac{C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\text{Sin}\left[\frac{5\,c}{2}\right]}{48\,d}+\frac{(12\,A+31\,C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{48\,d}+$$

$$\left.\frac{5\,C\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{32\,d}+\frac{C\,\text{Cos}\left[\frac{5\,c}{2}\right]\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{48\,d}+\frac{A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\,d}\right)$$

- **Problem 192: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 218 leaves, 6 steps):

$$\frac{a^{5/2}\,(8\,A+19\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{a^3\,(56\,A-27\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$

$$\frac{a^2\,(8\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{10\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 3, 943 leaves):

$$\frac{1}{32}\,(8\,A+19\,C)\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{5}$$
$$\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^{5}\left(\frac{5\,C\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{8\,d}+\frac{C\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{16\,d}+\right.$$
$$\frac{5\,C\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{8\,d}+\frac{C\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{16\,d}+$$
$$\left.\frac{4\,A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}+\frac{A\,\text{Sec}[c+d\,x]^{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{6\,d}\right)$$

- **Problem 193: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\left(A+C\,\text{Cos}[c+d\,x]^{2}\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 3, 210 leaves, 6 steps):

$$\frac{5\,a^{5/2}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}-\frac{a^{3}\,(64\,A+15\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,a^{2}\,(8\,A+5\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}$$

Result (type 3, 853 leaves):

$$\frac{1}{240\sqrt{2}\, d\, \mathrm{Cos}[c+d x]^{5/2}\sqrt{\mathrm{Cos}[c+d x]\,(\mathrm{Cos}[d x]+i\,\mathrm{Sin}[d x])}}\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d x)\right]^5$$

$$\Bigg(\frac{75}{4}\,C\,e^{-\frac{5}{2} i d x}\,\mathrm{Cos}\left[\frac{c}{2}\right]^2\,\mathrm{Log}\left[2\left(e^{i d x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\right]$$

$$\left(i\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]-\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)^3+\frac{75}{4}\,C\,e^{-\frac{5}{2} i d x}\,\mathrm{Log}\Bigg[$$

$$2\left(e^{i d x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\Bigg]\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]-\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)^3+$$

$$\frac{75}{4}\,i\,C\,e^{-\frac{5}{2} i d x}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right]\,\mathrm{Cos}\left[\frac{c}{2}\right]^2$$

$$\left(\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)^3+\frac{75}{4}\,i\,C\,e^{-\frac{5}{2} i d x}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right]$$

$$\mathrm{Sin}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)^3+60\sqrt{2}\,C\,\mathrm{Cos}\left[\frac{d x}{2}\right]\mathrm{Cos}[c+d x]^3\,\mathrm{Sin}\left[\frac{c}{2}\right]\sqrt{\mathrm{Cos}[c+d x]\,(\mathrm{Cos}[d x]+i\,\mathrm{Sin}[d x])}+$$

$$60\sqrt{2}\,C\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Cos}[c+d x]^3\,\mathrm{Sin}\left[\frac{d x}{2}\right]\sqrt{\mathrm{Cos}[c+d x]\,(\mathrm{Cos}[d x]+i\,\mathrm{Sin}[d x])}+$$

$$24\,A\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\;\mathrm{Sin}\left[\frac{1}{2}\,(c+d x)\right]+$$

$$112\,A\,\mathrm{Cos}[c+d x]\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\;\mathrm{Sin}\left[\frac{1}{2}\,(c+d x)\right]+$$

$$344\sqrt{2}\,A\,\mathrm{Cos}[c+d x]^2\sqrt{\mathrm{Cos}[c+d x]\,(\mathrm{Cos}[d x]+i\,\mathrm{Sin}[d x])}\;\mathrm{Sin}\left[\frac{1}{2}\,(c+d x)\right]+$$

$$120\sqrt{2}\,C\,\mathrm{Cos}[c+d x]^2\sqrt{\mathrm{Cos}[c+d x]\,(\mathrm{Cos}[d x]+i\,\mathrm{Sin}[d x])}\;\mathrm{Sin}\left[\frac{1}{2}\,(c+d x)\right]\Bigg)$$

- **Problem 194: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\mathrm{Cos}[c+d x])^{5/2}\left(A+C\,\mathrm{Cos}[c+d x]^2\right)}{\mathrm{Cos}[c+d x]^{9/2}}\,dx$$

Optimal (type 3, 210 leaves, 6 steps):

$$\frac{2\,a^{5/2}\,C\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]}{d}+\frac{2\,a^3\,(32\,A+49\,C)\,\mathrm{Sin}[c+d x]}{21\,d\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d x]}}+$$

$$\frac{2\,a^2\,(8\,A+7\,C)\sqrt{a+a\,\mathrm{Cos}[c+d x]}\;\mathrm{Sin}[c+d x]}{21\,d\,\mathrm{Cos}[c+d x]^{3/2}}+\frac{2\,a\,A\,(a+a\,\mathrm{Cos}[c+d x])^{3/2}\,\mathrm{Sin}[c+d x]}{7\,d\,\mathrm{Cos}[c+d x]^{5/2}}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d x])^{5/2}\,\mathrm{Sin}[c+d x]}{7\,d\,\mathrm{Cos}[c+d x]^{7/2}}$$

Result (type 3, 949 leaves):

$$\frac{1}{4} C\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\, \text{Sec}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^5$$

$$\Big(\frac{1}{2}\, i\, \text{Sin}\Big[\frac{c}{2}\Big] \Big(-\Big(2\, i\, e^{\frac{i d x}{2}}\, \text{Log}\Big[2 \Big(e^{i d x} \text{Cos}\Big[\frac{c}{2}\Big]+i\, e^{i d x} \text{Sin}\Big[\frac{c}{2}\Big]+\sqrt{(1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big)\Big] \Big(\text{Cos}\Big[\frac{c}{2}\Big]-i\, \text{Sin}\Big[\frac{c}{2}\Big]\Big)$$

$$\sqrt{e^{-i d x}\, ((1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c])}\Big)\Big/\Big(d \sqrt{2\, (1+e^{2 i d x}) \text{Cos}[c]+2\, i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big) -$$

$$\Big(2\, i\, e^{\frac{i d x}{2}}\, \text{ArcTanh}\Big[\Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\, \text{Sin}\Big[\frac{c}{2}\Big]\Big) \sqrt{(1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big] \Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\, \text{Sin}\Big[\frac{c}{2}\Big]\Big)$$

$$\sqrt{e^{-i d x}\, ((1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c])}\Big)\Big/\Big(d \sqrt{2\, (1+e^{2 i d x}) \text{Cos}[c]+2\, i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big)\Big) +$$

$$\frac{1}{2} \text{Cos}\Big[\frac{c}{2}\Big] \Big(-\Big(2\, i\, e^{\frac{i d x}{2}}\, \text{Log}\Big[2 \Big(e^{i d x} \text{Cos}\Big[\frac{c}{2}\Big]+i\, e^{i d x} \text{Sin}\Big[\frac{c}{2}\Big]+\sqrt{(1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big)\Big] \Big(\text{Cos}\Big[\frac{c}{2}\Big]-i\, \text{Sin}\Big[\frac{c}{2}\Big]\Big)$$

$$\sqrt{e^{-i d x}\, ((1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c])}\Big)\Big/\Big(d \sqrt{2\, (1+e^{2 i d x}) \text{Cos}[c]+2\, i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big) +$$

$$\Big(2\, i\, e^{\frac{i d x}{2}}\, \text{ArcTanh}\Big[\Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\, \text{Sin}\Big[\frac{c}{2}\Big]\Big) \sqrt{(1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big] \Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\, \text{Sin}\Big[\frac{c}{2}\Big]\Big)$$

$$\sqrt{e^{-i d x}\, ((1+e^{2 i d x}) \text{Cos}[c]+i\, (-1+e^{2 i d x}) \text{Sin}[c])}\Big)\Big/\Big(d \sqrt{2\, (1+e^{2 i d x}) \text{Cos}[c]+2\, i\, (-1+e^{2 i d x}) \text{Sin}[c]}\Big)\Big)\Big) +$$

$$\sqrt{\text{Cos}[c+d x]}\, (a\, (1+\text{Cos}[c+d x]))^{5/2}\, \text{Sec}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^5 \Big(\frac{2 A\, \text{Sec}[c+d x]^3\, \text{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]}{7 d}+\frac{A\, \text{Sec}[c+d x]^4\, \text{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]}{14 d}+$$

$$\frac{\text{Sec}[c+d x]^2\, \big(23 A\, \text{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]+7 C\, \text{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]\big)}{42 d}+$$

$$\frac{\text{Sec}[c+d x]\, \big(23 A\, \text{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]+28 C\, \text{Sin}\big[\frac{c}{2}+\frac{d x}{2}\big]\big)}{21 d}\Big)$$

- **Problem 198: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\text{Cos}[c+d x]^{3/2}\, \big(A+C\, \text{Cos}[c+d x]^2\big)}{\sqrt{a+a\, \text{Cos}[c+d x]}}\, dx$$

Optimal (type 3, 226 leaves, 8 steps):

$$-\frac{(8 A+9 C)\, \text{ArcSin}\Big[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{a+a\, \text{Cos}[c+d x]}}\Big]}{8 \sqrt{a}\, d}+\frac{\sqrt{2}\, (A+C)\, \text{ArcTan}\Big[\frac{\sqrt{a}\, \text{Sin}[c+d x]}{\sqrt{2}\, \sqrt{\text{Cos}[c+d x]}\, \sqrt{a+a\, \text{Cos}[c+d x]}}\Big]}{\sqrt{a}\, d}+$$

$$\frac{(8 A+7 C)\, \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{8 d \sqrt{a+a\, \text{Cos}[c+d x]}}-\frac{C\, \text{Cos}[c+d x]^{3/2}\, \text{Sin}[c+d x]}{12 d \sqrt{a+a\, \text{Cos}[c+d x]}}+\frac{C\, \text{Cos}[c+d x]^{5/2}\, \text{Sin}[c+d x]}{3 d \sqrt{a+a\, \text{Cos}[c+d x]}}$$

Result (type 3, 349 leaves):

$$\frac{1}{48\, d\, \sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(-\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}3\,i\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(-8\,i\,A\,d\,x-9\,i\,C\,d\,x-(8\,A+9\,C)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+16\,\sqrt{2}\,(A+C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+8\,A\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+9\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-16\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-16\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+4\,\sqrt{\text{Cos}[c+d\,x]}\,(24\,A+25\,C-2\,C\,\text{Cos}[c+d\,x]+4\,C\,\text{Cos}[2\,(c+d\,x)])\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 199: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 183 leaves, 7 steps):

$$\frac{(8\,A+7\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,\sqrt{a}\,d}-\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{C\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 344 leaves):

$$\frac{1}{8\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(8\,A\,d\,x+7\,C\,d\,x-i\,(8\,A+7\,C)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+8\,i\,\sqrt{2}\,(A+C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+8\,i\,A\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+7\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\left(-2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)}{d}\right)$$

- **Problem 200: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 133 leaves, 6 steps):

$$-\frac{C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 289 leaves):

$$\frac{1}{2\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\right.$$
$$\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(-i\,C\,d\,x-C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+2\,\sqrt{2}\,(A+C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-\right.$$
$$\left.\left.2\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{d}\right)$$

- **Problem 201: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 135 leaves, 6 steps):

$$\frac{2\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 288 leaves):

$$\frac{1}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\right.$$
$$\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(C\,d\,x-i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+i\,\sqrt{2}\,(A+C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-\right.$$
$$\left.\left.i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 202: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 136 leaves, 5 steps):

$$\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,A\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 181 leaves):

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)2\,i\,(A+C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{8\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^3}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}\right)$$

■ **Problem 203: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 181 leaves, 6 steps):

$$-\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,A\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,(13\,A+15\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 229 leaves):

$$\left(2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)15\,i\,(A+C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{6\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}[c+d\,x]^{5/2}}-\frac{2\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,(13\,A+15\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right)\right)\Big/\left(15\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

■ **Problem 204: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{9/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 224 leaves, 7 steps):

$$\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$

$$\frac{2\,A\,\text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,(31\,A+35\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(43\,A+35\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 212 leaves) :

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)2\,i\,(A+C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$

$$\left.\frac{4\,(73\,A+35\,C+24\,A\,\text{Cos}[c+d\,x]+(43\,A+35\,C)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^3}{105\,d\,\text{Cos}[c+d\,x]^{7/2}}\right)$$

## Problem 205: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 245 leaves, 8 steps) :

$$\frac{(8\,A+19\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,a^{3/2}\,d}-\frac{(5\,A+13\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-$$

$$\frac{(A+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}-\frac{(2\,A+7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{(A+2\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 370 leaves) :

$$\frac{1}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}\sqrt{2}\,e^{\frac{1}{2}i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(8\,A\,d\,x+19\,C\,d\,x-i\,(8\,A+19\,C)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+2\,i\,\sqrt{2}\,(5\,A+13\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+8\,i\,A\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+19\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-10\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-26\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-2\sqrt{\text{Cos}[c+d\,x]}\,(2\,A+6\,C+3\,C\,\text{Cos}[c+d\,x]-C\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 206: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 188 leaves, 7 steps):

$$-\frac{3\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{(A+9\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 316 leaves):

$$\frac{1}{2\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(-1\Big/\left(d\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)i\,\sqrt{2}\,e^{\frac{1}{2}i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(-6\,i\,C\,d\,x-6\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\sqrt{2}\,(A+9\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+6\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-9\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{2\sqrt{\text{Cos}[c+d\,x]}\,(A+3\,C+2\,C\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{d}\right)$$

- **Problem 207: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 145 leaves, 6 steps) :

$$\frac{2\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{(3\,A-5\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 313 leaves) :

$$\frac{1}{2\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(4\,C\,d\,x-4\,i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(3\,A-5\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$
$$\left.4\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+3\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-5\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-$$
$$\left.\frac{2\,(A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d}\right)$$

- **Problem 208: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 152 leaves, 5 steps) :

$$-\frac{(7\,A-C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(5\,A+C)\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 207 leaves) :

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)i\,(7\,A-C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$\left.\frac{(4\,A+(5\,A+C)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\,\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 209: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 201 leaves, 6 steps) :

$$\frac{(11\,A+3\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{2\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+$$
$$\frac{(7\,A+3\,C)\,\text{Sin}[c+d\,x]}{6\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(19\,A+3\,C)\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 226 leaves):

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,(11\,A+3\,C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$
$$\left.\frac{(11\,A+3\,C+24\,A\,\text{Cos}[c+d\,x]+(19\,A+3\,C)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\text{Cos}[c+d\,x]^{3/2}}\right)$$

- **Problem 210: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 248 leaves, 7 steps):

$$-\frac{(15\,A+7\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{2\,d\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+$$
$$\frac{(9\,A+5\,C)\,\text{Sin}[c+d\,x]}{10\,a\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(13\,A+5\,C)\,\text{Sin}[c+d\,x]}{10\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{(49\,A+25\,C)\,\text{Sin}[c+d\,x]}{10\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 254 leaves):

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,(15\,A+7\,C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$1\Big/\left(20\,d\,\text{Cos}[c+d\,x]^{5/2}\right)\,(88\,A+40\,C+(131\,A+75\,C)\,\text{Cos}[c+d\,x]+8\,(9\,A+5\,C)\,\text{Cos}[2\,(c+d\,x)]+49\,A\,\text{Cos}[3\,(c+d\,x)]+25\,C\,\text{Cos}[3\,(c+d\,x)])$$
$$\left.\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 211: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 237 leaves, 8 steps) :

$$-\frac{5\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}+\frac{(3\,A+115\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-$$

$$\frac{(A+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}+\frac{(A-15\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(3\,A+35\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 334 leaves) :

$$\frac{1}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5$$

$$\left(-\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}\,i\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(-80\,i\,C\,d\,x-80\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\sqrt{2}\,(3\,A+115\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$

$$\left.80\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-3\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-115\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$

$$\left.\sqrt{\text{Cos}[c+d\,x]}\,(3\,A+43\,C+(7\,A+55\,C)\,\text{Cos}[c+d\,x]+8\,C\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 212: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 192 leaves, 7 steps) :

$$\frac{2\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}+\frac{(5\,A-43\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-$$

$$\frac{(A+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}+\frac{(5\,A-11\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 327 leaves) :

$$\frac{1}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5 \left(\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(32\,C\,d\,x-32\,i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(5\,A-43\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+ 32\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+5\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-43\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+ \sqrt{\text{Cos}[c+d\,x]}\,(5\,A-11\,C+(A-15\,C)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 213: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 154 leaves, 5 steps):

$$\frac{(19\,A+3\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(9\,A-7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 217 leaves):

$$\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5 \left(-1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)i\,(19\,A+3\,C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)- \frac{1}{2}\sqrt{\text{Cos}[c+d\,x]}\,(13\,A-3\,C+(9\,A-7\,C)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)$$

- **Problem 214: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 199 leaves, 6 steps):

$$-\frac{5\,(15\,A-C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}- \frac{(13\,A-3\,C)\,\text{Sin}[c+d\,x]}{16\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(49\,A+C)\,\text{Sin}[c+d\,x]}{16\,a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 228 leaves):

$$\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^5 \left(1\Big/\left(\sqrt{1+e^{2 i (c+d x)}}\right) 5 i (15 A-C) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+1\Big/\left(4 \sqrt{\text{Cos}[c+d x]}\right) (113 A+C+10 (17 A+C) \text{Cos}[c+d x]+(49 A+C) \text{Cos}[2 (c+d x)]) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(4 d (a (1+\text{Cos}[c+d x]))^{5/2}\right)$$

- **Problem 215: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+C \text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{5/2} (a+a \text{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 246 leaves, 7 steps):

$$\frac{(163 A+19 C) \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-\frac{(A+C) \text{Sin}[c+d x]}{4 d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{5/2}}-\frac{(17 A+C) \text{Sin}[c+d x]}{16 a d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{3/2}}+\frac{5 (19 A+3 C) \text{Sin}[c+d x]}{48 a^2 d \text{Cos}[c+d x]^{3/2} \sqrt{a+a \text{Cos}[c+d x]}}-\frac{(299 A+27 C) \text{Sin}[c+d x]}{48 a^2 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}$$

Result (type 3, 256 leaves):

$$-\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^5 \left(1\Big/\left(\sqrt{1+e^{2 i (c+d x)}}\right) 3 i (163 A+19 C) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+1\Big/\left(8 \text{Cos}[c+d x]^{3/2}\right) (878 A+78 C+(1537 A+81 C) \text{Cos}[c+d x]+2 (503 A+39 C) \text{Cos}[2 (c+d x)]+299 A \text{Cos}[3 (c+d x)]+27 C \text{Cos}[3 (c+d x)]) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(12 d (a (1+\text{Cos}[c+d x]))^{5/2}\right)$$

- **Problem 221: Result more than twice size of optimal antiderivative.**

$$\int \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^2 \, dx$$

Optimal (type 3, 16 leaves, 3 steps):

$$C x+\frac{B \text{ArcTanh}[\text{Sin}[c+d x]]}{d}$$

Result (type 3, 73 leaves):

$$C x-\frac{B \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{B \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}$$

## Problem 222: Result more than twice size of optimal antiderivative.

$$\int (B \cos[c+d x]+C \cos[c+d x]^2) \sec[c+d x]^3 \, dx$$

Optimal (type 3, 24 leaves, 5 steps):

$$\frac{C \operatorname{ArcTanh}[\sin[c+d x]]}{d}+\frac{B \tan[c+d x]}{d}$$

Result (type 3, 81 leaves):

$$-\frac{C \log\left[\cos\left[\frac{c}{2}+\frac{d x}{2}\right]-\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{C \log\left[\cos\left[\frac{c}{2}+\frac{d x}{2}\right]+\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{B \tan[c+d x]}{d}$$

## Problem 225: Result more than twice size of optimal antiderivative.

$$\int (B \cos[c+d x]+C \cos[c+d x]^2) \sec[c+d x]^6 \, dx$$

Optimal (type 3, 85 leaves, 7 steps):

$$\frac{3 B \operatorname{ArcTanh}[\sin[c+d x]]}{8 d}+\frac{C \tan[c+d x]}{d}+\frac{3 B \sec[c+d x] \tan[c+d x]}{8 d}+\frac{B \sec[c+d x]^3 \tan[c+d x]}{4 d}+\frac{C \tan[c+d x]^3}{3 d}$$

Result (type 3, 227 leaves):

$$-\frac{3 B \log\left[\cos\left[\frac{1}{2} (c+d x)\right]-\sin\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+\frac{3 B \log\left[\cos\left[\frac{1}{2} (c+d x)\right]+\sin\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+$$
$$\frac{B}{16 d \left(\cos\left[\frac{1}{2} (c+d x)\right]-\sin\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{3 B}{16 d \left(\cos\left[\frac{1}{2} (c+d x)\right]-\sin\left[\frac{1}{2} (c+d x)\right]\right)^2}-\frac{B}{16 d \left(\cos\left[\frac{1}{2} (c+d x)\right]+\sin\left[\frac{1}{2} (c+d x)\right]\right)^4}-$$
$$\frac{3 B}{16 d \left(\cos\left[\frac{1}{2} (c+d x)\right]+\sin\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{2 C \tan[c+d x]}{3 d}+\frac{C \sec[c+d x]^2 \tan[c+d x]}{3 d}$$

## Problem 230: Result more than twice size of optimal antiderivative.

$$\int (a+a \cos[c+d x]) (B \cos[c+d x]+C \cos[c+d x]^2) \sec[c+d x]^2 \, dx$$

Optimal (type 3, 32 leaves, 5 steps):

$$a (B+C) x+\frac{a B \operatorname{ArcTanh}[\sin[c+d x]]}{d}+\frac{a C \sin[c+d x]}{d}$$

Result (type 3, 104 leaves):

$$a B x+a C x-\frac{a B \log\left[\cos\left[\frac{c}{2}+\frac{d x}{2}\right]-\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a B \log\left[\cos\left[\frac{c}{2}+\frac{d x}{2}\right]+\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a C \cos[d x] \sin[c]}{d}+\frac{a C \cos[c] \sin[d x]}{d}$$

## Problem 231: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \left(B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^3 \, dx$$

Optimal (type 3, 32 leaves, 5 steps):

$$a C x + \frac{a (B + C) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{d} + \frac{a B \operatorname{Tan}[c + d x]}{d}$$

Result (type 3, 159 leaves):

$$a C x - \frac{a B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} - \frac{a C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a B \operatorname{Tan}[c + d x]}{d}$$

## Problem 232: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \left(B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^4 \, dx$$

Optimal (type 3, 56 leaves, 7 steps):

$$\frac{a (B + 2 C) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{a (B + C) \operatorname{Tan}[c + d x]}{d} + \frac{a B \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d}$$

Result (type 3, 154 leaves):

$$\frac{1}{4 d} a \left(-2 (B + 2 C) \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 2 B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 4 C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \frac{B}{\left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{B}{\left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + 4 (B + C) \operatorname{Tan}[c + d x]\right)$$

## Problem 234: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \left(B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^6 \, dx$$

Optimal (type 3, 106 leaves, 8 steps):

$$\frac{a (3 B + 4 C) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{8 d} + \frac{a (B + C) \operatorname{Tan}[c + d x]}{d} + \frac{a (3 B + 4 C) \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{8 d} + \frac{a B \operatorname{Sec}[c + d x]^3 \operatorname{Tan}[c + d x]}{4 d} + \frac{a (B + C) \operatorname{Tan}[c + d x]^3}{3 d}$$

Result (type 3, 403 leaves):

$$-\frac{3\,a\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}-\frac{a\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{2\,d}+\frac{3\,a\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{a\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{2\,d}+\frac{a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{3\,a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$
$$\frac{a\,C}{4\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-\frac{3\,a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-$$
$$\frac{a\,C}{4\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{2\,a\,B\,\text{Tan}[c+d\,x]}{3\,d}+\frac{2\,a\,C\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,C\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

## Problem 240: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\text{Cos}[c+d\,x])^2\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 88 leaves, 6 steps):

$$a^2\,C\,x+\frac{a^2\,(3\,B+4\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{a^2\,(3\,B+2\,C)\,\text{Tan}[c+d\,x]}{2\,d}+\frac{B\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 277 leaves):

$$\frac{1}{16}a^2\,(1+\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^4$$
$$\left(4\,C\,x-\frac{2\,(3\,B+4\,C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{d}+\frac{2\,(3\,B+4\,C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{d}+\right.$$
$$\frac{B}{d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4\,(2\,B+C)\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}-$$
$$\left.\frac{B}{d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4\,(2\,B+C)\,\text{Sin}\left[\frac{d\,x}{2}\right]}{d\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)$$

## Problem 241: Result more than twice size of optimal antiderivative.

$$\int (a+a\,\text{Cos}[c+d\,x])^2\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 113 leaves, 8 steps):

$$\frac{a^2 (2 B+3 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}+\frac{a^2 (5 B+6 C) \text{Tan}[c+d x]}{3 d}+\frac{a^2 (4 B+3 C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{6 d}+\frac{B \left(a^2+a^2 \text{Cos}[c+d x]\right) \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

Result (type 3, 753 leaves):

$$\frac{(-2 B-3 C) (a+a \text{Cos}[c+d x])^2 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{8 d}+$$

$$\frac{(2 B+3 C) (a+a \text{Cos}[c+d x])^2 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4}{8 d}+\frac{B (a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sin}\left[\frac{d x}{2}\right]}{24 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{(a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(7 B \text{Cos}\left[\frac{c}{2}\right]+3 C \text{Cos}\left[\frac{c}{2}\right]-5 B \text{Sin}\left[\frac{c}{2}\right]-3 C \text{Sin}\left[\frac{c}{2}\right]\right)}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{(a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(5 B \text{Sin}\left[\frac{d x}{2}\right]+6 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{12 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+\frac{B (a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sin}\left[\frac{d x}{2}\right]}{24 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+$$

$$\frac{(a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(-7 B \text{Cos}\left[\frac{c}{2}\right]-3 C \text{Cos}\left[\frac{c}{2}\right]-5 B \text{Sin}\left[\frac{c}{2}\right]-3 C \text{Sin}\left[\frac{c}{2}\right]\right)}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+$$

$$\frac{(a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(5 B \text{Sin}\left[\frac{d x}{2}\right]+6 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{12 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

- **Problem 248: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^3 \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 110 leaves, 7 steps):

$$\frac{1}{2} a^3 (6 B+7 C) x+\frac{a^3 (3 B+C) \text{ArcTanh}[\text{Sin}[c+d x]]}{d}+\frac{5 a^3 C \text{Sin}[c+d x]}{2 d}-\frac{(2 B-C) \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{2 d}+\frac{a B (a+a \text{Cos}[c+d x])^2 \text{Tan}[c+d x]}{d}$$

Result (type 3, 272 leaves):

$$\frac{1}{32} a^3 (1+\text{Cos}[c+d x])^3 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^6 \left(2 (6 B+7 C) x-\frac{4 (3 B+C) \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d}+\frac{4 (3 B+C) \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{d}+\frac{4 (B+3 C) \text{Cos}[d x] \text{Sin}[c]}{d}+\frac{C \text{Cos}[2 d x] \text{Sin}[2 c]}{d}+\frac{4 (B+3 C) \text{Cos}[c] \text{Sin}[d x]}{d}+\frac{C \text{Cos}[2 c] \text{Sin}[2 d x]}{d}+\frac{4 B \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+\frac{4 B \text{Sin}\left[\frac{d x}{2}\right]}{d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}\right)$$

- **Problem 250: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^3 \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 125 leaves, 7 steps) :

$$a^3 C x+\frac{a^3 (5 B+7 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}+\frac{5 a^3 (B+C) \text{Tan}[c+d x]}{2 d}+\frac{(5 B+3 C) \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{6 d}+\frac{a B (a+a \text{Cos}[c+d x])^2 \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

Result (type 3, 786 leaves) :

$$\frac{1}{8} C x (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6+\frac{(-5 B-7 C) (a+a \text{Cos}[c+d x])^3 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{16 d}+\frac{(5 B+7 C) (a+a \text{Cos}[c+d x])^3 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{16 d}+\frac{B (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}\left[\frac{d x}{2}\right]}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(10 B \text{Cos}\left[\frac{c}{2}\right]+3 C \text{Cos}\left[\frac{c}{2}\right]-8 B \text{Sin}\left[\frac{c}{2}\right]-3 C \text{Sin}\left[\frac{c}{2}\right]\right)}{96 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(11 B \text{Sin}\left[\frac{d x}{2}\right]+9 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{24 d \left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}+\frac{B (a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sin}\left[\frac{d x}{2}\right]}{48 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^3}+\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(-10 B \text{Cos}\left[\frac{c}{2}\right]-3 C \text{Cos}\left[\frac{c}{2}\right]-8 B \text{Sin}\left[\frac{c}{2}\right]-3 C \text{Sin}\left[\frac{c}{2}\right]\right)}{96 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)^2}+\frac{(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(11 B \text{Sin}\left[\frac{d x}{2}\right]+9 C \text{Sin}\left[\frac{d x}{2}\right]\right)}{24 d \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}$$

## Problem 253: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]^2 \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right)}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 122 leaves, 7 steps):

$$\frac{3 (B-C) x}{2 a}-\frac{(3 B-4 C) \text{Sin}[c+d x]}{a d}+\frac{3 (B-C) \text{Cos}[c+d x] \text{Sin}[c+d x]}{2 a d}+\frac{(B-C) \text{Cos}[c+d x]^3 \text{Sin}[c+d x]}{d (a+a \text{Cos}[c+d x])}+\frac{(3 B-4 C) \text{Sin}[c+d x]^3}{3 a d}$$

Result (type 3, 249 leaves):

$$\frac{1}{24 a d (1+\text{Cos}[c+d x])} \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Sec}\left[\frac{c}{2}\right] \left(36 (B-C) d x \text{Cos}\left[\frac{d x}{2}\right]+36 (B-C) d x \text{Cos}\left[c+\frac{d x}{2}\right]-60 B \text{Sin}\left[\frac{d x}{2}\right]+69 C \text{Sin}\left[\frac{d x}{2}\right]-12 B \text{Sin}\left[c+\frac{d x}{2}\right]+ 21 C \text{Sin}\left[c+\frac{d x}{2}\right]-9 B \text{Sin}\left[c+\frac{3 d x}{2}\right]+18 C \text{Sin}\left[c+\frac{3 d x}{2}\right]-9 B \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+18 C \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+ 3 B \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-2 C \text{Sin}\left[2 c+\frac{5 d x}{2}\right]+3 B \text{Sin}\left[3 c+\frac{5 d x}{2}\right]-2 C \text{Sin}\left[3 c+\frac{5 d x}{2}\right]+C \text{Sin}\left[3 c+\frac{7 d x}{2}\right]+C \text{Sin}\left[4 c+\frac{7 d x}{2}\right]\right)$$

## Problem 255: Result more than twice size of optimal antiderivative.

$$\int \frac{B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 54 leaves, 4 steps):

$$\frac{(B-C) x}{a}+\frac{C \text{Sin}[c+d x]}{a d}-\frac{(B-C) \text{Sin}[c+d x]}{a d (1+\text{Cos}[c+d x])}$$

Result (type 3, 126 leaves):

$$\frac{1}{2 a d (1+\text{Cos}[c+d x])} \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Sec}\left[\frac{c}{2}\right] \left(2 (B-C) d x \text{Cos}\left[\frac{d x}{2}\right]+2 (B-C) d x \text{Cos}\left[c+\frac{d x}{2}\right]-4 B \text{Sin}\left[\frac{d x}{2}\right]+5 C \text{Sin}\left[\frac{d x}{2}\right]+C \text{Sin}\left[c+\frac{d x}{2}\right]+C \text{Sin}\left[c+\frac{3 d x}{2}\right]+C \text{Sin}\left[2 c+\frac{3 d x}{2}\right]\right)$$

## Problem 256: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 34 leaves, 3 steps):

$$\frac{C x}{a}+\frac{(B-C) \text{Sin}[c+d x]}{d (a+a \text{Cos}[c+d x])}$$

Result (type 3, 72 leaves):

$$\frac{\text{Cos}\left[\frac{1}{2}(c+d x)\right] \text{Sec}\left[\frac{c}{2}\right] \left(C d x \text{Cos}\left[\frac{d x}{2}\right]+C d x \text{Cos}\left[c+\frac{d x}{2}\right]+2 (B-C) \text{Sin}\left[\frac{d x}{2}\right]\right)}{a d (1+\text{Cos}[c+d x])}$$

- **Problem 257: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^2}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 44 leaves, 4 steps):

$$\frac{B \text{ArcTanh}[\text{Sin}[c+d x]]}{a d}-\frac{(B-C) \text{Sin}[c+d x]}{d (a+a \text{Cos}[c+d x])}$$

Result (type 3, 109 leaves):

$$\frac{1}{a d (1+\text{Cos}[c+d x])} 2 \text{Cos}\left[\frac{1}{2}(c+d x)\right] \left(B \text{Cos}\left[\frac{1}{2}(c+d x)\right] \left(-\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]+\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\right)+(-B+C) \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]\right)$$

- **Problem 258: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 69 leaves, 6 steps):

$$-\frac{(B-C) \text{ArcTanh}[\text{Sin}[c+d x]]}{a d}+\frac{(2 B-C) \text{Tan}[c+d x]}{a d}-\frac{(B-C) \text{Tan}[c+d x]}{d (a+a \text{Cos}[c+d x])}$$

Result (type 3, 201 leaves):

$$\frac{1}{a d (1+\text{Cos}[c+d x])} 2 \text{Cos}\left[\frac{1}{2}(c+d x)\right] \left((B-C) \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+\text{Cos}\left[\frac{1}{2}(c+d x)\right] \left((B-C) \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\right)+\right.\right.$$
$$\left.\left.(B \text{Sin}[d x]) \Big/ \left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)\right)\right)\right)$$

- **Problem 259: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^4}{a+a \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 107 leaves, 7 steps):

$$\frac{(3 B-2 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a d}-\frac{2 (B-C) \text{Tan}[c+d x]}{a d}+\frac{(3 B-2 C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a d}-\frac{(B-C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{d (a+a \text{Cos}[c+d x])}$$

Result (type 3, 289 leaves) :

$$\frac{1}{2\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(4\,(-B+C)\,\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left((-6\,B+4\,C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+6\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-4\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{B}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{B}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-(4\,(B-C)\,\text{Sin}[d\,x])\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)\right)$$

- **Problem 260: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^5}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 131 leaves, 7 steps) :

$$-\frac{3\,(B-C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a\,d}+\frac{(4\,B-3\,C)\,\text{Tan}[c+d\,x]}{a\,d}-\frac{3\,(B-C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a\,d}-\frac{(B-C)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}+\frac{(4\,B-3\,C)\,\text{Tan}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 567 leaves) :

$$\frac{1}{a}\left(\frac{3\,(B-C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(1+\mathrm{Cos}[c+d\,x])}-\right.$$

$$\frac{3\,(B-C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(1+\mathrm{Cos}[c+d\,x])}+\frac{1}{48\,d\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3$$

$$\left(6\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+6\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+39\,B\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-27\,C\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]-24\,B\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]+12\,C\,\mathrm{Sin}\left[c-\frac{d\,x}{2}\right]-6\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+\right.$$

$$6\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-24\,B\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+24\,C\,\mathrm{Sin}\left[2\,c+\frac{d\,x}{2}\right]+21\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+9\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$

$$9\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-9\,B\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+9\,C\,\mathrm{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]+7\,B\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]-3\,C\,\mathrm{Sin}\left[c+\frac{5\,d\,x}{2}\right]+B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$

$$3\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-3\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-9\,B\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+9\,C\,\mathrm{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]+16\,B\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$

$$\left.\left.12\,C\,\mathrm{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+10\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-6\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+6\,B\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-6\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)\right)$$

- **Problem 261: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^3\,\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 170 leaves, 8 steps):

$$\frac{(7\,B-10\,C)\,x}{2\,a^2}-\frac{4\,(2\,B-3\,C)\,\mathrm{Sin}[c+d\,x]}{a^2\,d}+\frac{(7\,B-10\,C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a^2\,d}+$$

$$\frac{(7\,B-10\,C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(B-C)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{4\,(2\,B-3\,C)\,\mathrm{Sin}[c+d\,x]^3}{3\,a^2\,d}$$

Result (type 3, 369 leaves):

$$\frac{1}{48\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(36\,(7\,B-10\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+36\,(7\,B-10\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+84\,B\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]-120\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$84\,B\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-120\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-381\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+516\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+147\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-$$
$$156\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-239\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+342\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-63\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+118\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$
$$15\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+30\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-15\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+30\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-$$
$$\left.3\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3\,B\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-3\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 262: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^2\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 147 leaves, 4 steps):

$$-\frac{(4\,B-7\,C)\,x}{2\,a^2}+\frac{2\,(5\,B-8\,C)\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d}-\frac{(4\,B-7\,C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a^2\,d}+$$
$$\frac{(5\,B-8\,C)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(B-C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 3, 315 leaves):

$$\frac{1}{48\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(-36\,(4\,B-7\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-36\,(4\,B-7\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]-48\,B\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+84\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]-\right.$$
$$48\,B\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+84\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+264\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-381\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-120\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+147\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+$$
$$164\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-239\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+36\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-63\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+12\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$
$$\left.15\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+12\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-15\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 264: Result more than twice size of optimal antiderivative.**

$$\int\frac{B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 70 leaves, 3 steps):

$$\frac{C\,x}{a^2}+\frac{(2\,B-5\,C)\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(B-C)\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 3, 153 leaves):

$$\frac{1}{24\,a^2\,d}\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(9\,C\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+9\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+3\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+3\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+\right.$$
$$\left.6\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-18\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-6\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+12\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+4\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-10\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

## Problem 266: Result more than twice size of optimal antiderivative.

$$\int\frac{\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 79 leaves, 5 steps):

$$\frac{B\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a^2\,d}-\frac{(4\,B-C)\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(B-C)\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 3, 170 leaves):

$$-\frac{1}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])^2}$$
$$2\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(6\,B\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+\right.$$
$$\left.(B-C)\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+2\,(4\,B-C)\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+(B-C)\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Tan}\left[\frac{c}{2}\right]\right)$$

## Problem 267: Result more than twice size of optimal antiderivative.

$$\int\frac{\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 107 leaves, 7 steps):

$$-\frac{(2\,B-C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a^2\,d}+\frac{2\,(5\,B-2\,C)\,\mathrm{Tan}[c+d\,x]}{3\,a^2\,d}-\frac{(2\,B-C)\,\mathrm{Tan}[c+d\,x]}{a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(B-C)\,\mathrm{Tan}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 3, 264 leaves):

$$\frac{1}{3 a^2 d (1+\text{Cos}[c+d x])^2} 2 \text{Cos}\left[\frac{1}{2} (c+d x)\right] \left((B-C) \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+2 (7 B-4 C) \text{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \text{Sec}\left[\frac{c}{2}\right] \text{Sin}\left[\frac{d x}{2}\right]+6 \text{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \left((2 B-C) \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)+(B \text{Sin}[d x]) \Big/ \left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)\right)+(B-C) \text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Tan}\left[\frac{c}{2}\right]\right)$$

## Problem 268: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^4}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 152 leaves, 8 steps):

$$\frac{(7 B-4 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a^2 d}-\frac{2 (8 B-5 C) \text{Tan}[c+d x]}{3 a^2 d}+\frac{(7 B-4 C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a^2 d}-\frac{(8 B-5 C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 a^2 d (1+\text{Cos}[c+d x])}-\frac{(B-C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 572 leaves):

$$\frac{1}{a^2}\left(-\frac{2 (7 B-4 C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d (1+\text{Cos}[c+d x])^2}+\frac{2 (7 B-4 C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d (1+\text{Cos}[c+d x])^2}+\frac{1}{48 d (1+\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \text{Sec}\left[\frac{c}{2}\right] \text{Sec}[c] \text{Sec}[c+d x]^2 \left(14 B \text{Sin}\left[\frac{d x}{2}\right]-14 C \text{Sin}\left[\frac{d x}{2}\right]-97 B \text{Sin}\left[\frac{3 d x}{2}\right]+64 C \text{Sin}\left[\frac{3 d x}{2}\right]+126 B \text{Sin}\left[c-\frac{d x}{2}\right]-84 C \text{Sin}\left[c-\frac{d x}{2}\right]-42 B \text{Sin}\left[c+\frac{d x}{2}\right]+42 C \text{Sin}\left[c+\frac{d x}{2}\right]+98 B \text{Sin}\left[2 c+\frac{d x}{2}\right]-56 C \text{Sin}\left[2 c+\frac{d x}{2}\right]+3 B \text{Sin}\left[c+\frac{3 d x}{2}\right]-6 C \text{Sin}\left[c+\frac{3 d x}{2}\right]-37 B \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+34 C \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+63 B \text{Sin}\left[3 c+\frac{3 d x}{2}\right]-36 C \text{Sin}\left[3 c+\frac{3 d x}{2}\right]-75 B \text{Sin}\left[c+\frac{5 d x}{2}\right]+48 C \text{Sin}\left[c+\frac{5 d x}{2}\right]-15 B \text{Sin}\left[2 c+\frac{5 d x}{2}\right]+6 C \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-39 B \text{Sin}\left[3 c+\frac{5 d x}{2}\right]+30 C \text{Sin}\left[3 c+\frac{5 d x}{2}\right]+21 B \text{Sin}\left[4 c+\frac{5 d x}{2}\right]-12 C \text{Sin}\left[4 c+\frac{5 d x}{2}\right]-32 B \text{Sin}\left[2 c+\frac{7 d x}{2}\right]+20 C \text{Sin}\left[2 c+\frac{7 d x}{2}\right]-12 B \text{Sin}\left[3 c+\frac{7 d x}{2}\right]+6 C \text{Sin}\left[3 c+\frac{7 d x}{2}\right]-20 B \text{Sin}\left[4 c+\frac{7 d x}{2}\right]+14 C \text{Sin}\left[4 c+\frac{7 d x}{2}\right]\right)\right)$$

## Problem 269: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]^3 \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right)}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 193 leaves, 5 steps) :

$$-\frac{(6B-13C)\,x}{2a^3}+\frac{8\,(9B-19C)\,\mathrm{Sin}[c+d\,x]}{15a^3d}-\frac{(6B-13C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2a^3d}+\frac{(B-C)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{5d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{(6B-11C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{15ad\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+\frac{4\,(9B-19C)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{15d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 3, 435 leaves) :

$$\frac{1}{480a^3d\,(1+\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(-600\,(6B-13C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-600\,(6B-13C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]-1800\,B\,d\,x\,\mathrm{Cos}\left[c+\frac{3d\,x}{2}\right]+3900\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3d\,x}{2}\right]-1800\,B\,d\,x\,\mathrm{Cos}\left[2c+\frac{3d\,x}{2}\right]+3900\,C\,d\,x\,\mathrm{Cos}\left[2c+\frac{3d\,x}{2}\right]-360\,B\,d\,x\,\mathrm{Cos}\left[2c+\frac{5d\,x}{2}\right]+780\,C\,d\,x\,\mathrm{Cos}\left[2c+\frac{5d\,x}{2}\right]-360\,B\,d\,x\,\mathrm{Cos}\left[3c+\frac{5d\,x}{2}\right]+780\,C\,d\,x\,\mathrm{Cos}\left[3c+\frac{5d\,x}{2}\right]+7020\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-12760\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-4500\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+7560\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+4860\,B\,\mathrm{Sin}\left[c+\frac{3d\,x}{2}\right]-9230\,C\,\mathrm{Sin}\left[c+\frac{3d\,x}{2}\right]-900\,B\,\mathrm{Sin}\left[2c+\frac{3d\,x}{2}\right]+930\,C\,\mathrm{Sin}\left[2c+\frac{3d\,x}{2}\right]+1452\,B\,\mathrm{Sin}\left[2c+\frac{5d\,x}{2}\right]-2782\,C\,\mathrm{Sin}\left[2c+\frac{5d\,x}{2}\right]+300\,B\,\mathrm{Sin}\left[3c+\frac{5d\,x}{2}\right]-750\,C\,\mathrm{Sin}\left[3c+\frac{5d\,x}{2}\right]+60\,B\,\mathrm{Sin}\left[3c+\frac{7d\,x}{2}\right]-105\,C\,\mathrm{Sin}\left[3c+\frac{7d\,x}{2}\right]+60\,B\,\mathrm{Sin}\left[4c+\frac{7d\,x}{2}\right]-105\,C\,\mathrm{Sin}\left[4c+\frac{7d\,x}{2}\right]+15\,C\,\mathrm{Sin}\left[4c+\frac{9d\,x}{2}\right]+15\,C\,\mathrm{Sin}\left[5c+\frac{9d\,x}{2}\right]\right)$$

- **Problem 270: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^2\,\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 147 leaves, 8 steps) :

$$\frac{(B-3C)\,x}{a^3}-\frac{(7B-27C)\,\mathrm{Sin}[c+d\,x]}{15a^3d}+\frac{(B-C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{5d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{(4B-9C)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{15ad\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(B-3C)\,\mathrm{Sin}[c+d\,x]}{d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 3, 361 leaves) :

$$\frac{1}{120\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(300\,(B-3\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+300\,(B-3\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+150\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-450\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$150\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-450\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+30\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-90\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$30\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-90\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-740\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+1755\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+540\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-$$
$$1125\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-460\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+1215\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+180\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-225\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$
$$\left.128\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+363\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+75\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 271: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 116 leaves, 6 steps):

$$\frac{C\,x}{a^3}+\frac{(B-C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(2\,B-7\,C)\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{(4\,B-29\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 241 leaves):

$$\frac{1}{480\,a^3\,d}\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^5\left(150\,C\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+150\,C\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+75\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+75\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+15\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+\right.$$
$$15\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+80\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-370\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]-60\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+270\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+40\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$
$$\left.230\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-30\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+90\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+14\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-64\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]\right)$$

- **Problem 275: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 145 leaves, 8 steps):

$$-\frac{(3\,B-C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^3\,d}+\frac{2\,(36\,B-11\,C)\,\text{Tan}[c+d\,x]}{15\,a^3\,d}-\frac{(B-C)\,\text{Tan}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(9\,B-4\,C)\,\text{Tan}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(3\,B-C)\,\text{Tan}[c+d\,x]}{d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 556 leaves):

$$\frac{1}{a^3}\left(\frac{8\,(3B-C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{d\,(1+\mathrm{Cos}[c+dx])^3}-\right.$$

$$\frac{8\,(3B-C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]}{d\,(1+\mathrm{Cos}[c+dx])^3}+\frac{1}{120\,d\,(1+\mathrm{Cos}[c+dx])^3}\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[c]\,\mathrm{Sec}[c+dx]$$

$$\left(-255\,B\,\mathrm{Sin}\left[\frac{dx}{2}\right]+160\,C\,\mathrm{Sin}\left[\frac{dx}{2}\right]+567\,B\,\mathrm{Sin}\left[\frac{3dx}{2}\right]-167\,C\,\mathrm{Sin}\left[\frac{3dx}{2}\right]-600\,B\,\mathrm{Sin}\left[c-\frac{dx}{2}\right]+170\,C\,\mathrm{Sin}\left[c-\frac{dx}{2}\right]+375\,B\,\mathrm{Sin}\left[c+\frac{dx}{2}\right]-\right.$$

$$170\,C\,\mathrm{Sin}\left[c+\frac{dx}{2}\right]-480\,B\,\mathrm{Sin}\left[2c+\frac{dx}{2}\right]+160\,C\,\mathrm{Sin}\left[2c+\frac{dx}{2}\right]-60\,B\,\mathrm{Sin}\left[c+\frac{3dx}{2}\right]+75\,C\,\mathrm{Sin}\left[c+\frac{3dx}{2}\right]+402\,B\,\mathrm{Sin}\left[2c+\frac{3dx}{2}\right]-$$

$$167\,C\,\mathrm{Sin}\left[2c+\frac{3dx}{2}\right]-225\,B\,\mathrm{Sin}\left[3c+\frac{3dx}{2}\right]+75\,C\,\mathrm{Sin}\left[3c+\frac{3dx}{2}\right]+315\,B\,\mathrm{Sin}\left[c+\frac{5dx}{2}\right]-95\,C\,\mathrm{Sin}\left[c+\frac{5dx}{2}\right]+30\,B\,\mathrm{Sin}\left[2c+\frac{5dx}{2}\right]+$$

$$15\,C\,\mathrm{Sin}\left[2c+\frac{5dx}{2}\right]+240\,B\,\mathrm{Sin}\left[3c+\frac{5dx}{2}\right]-95\,C\,\mathrm{Sin}\left[3c+\frac{5dx}{2}\right]-45\,B\,\mathrm{Sin}\left[4c+\frac{5dx}{2}\right]+15\,C\,\mathrm{Sin}\left[4c+\frac{5dx}{2}\right]+$$

$$\left.\left.72\,B\,\mathrm{Sin}\left[2c+\frac{7dx}{2}\right]-22\,C\,\mathrm{Sin}\left[2c+\frac{7dx}{2}\right]+15\,B\,\mathrm{Sin}\left[3c+\frac{7dx}{2}\right]+57\,B\,\mathrm{Sin}\left[4c+\frac{7dx}{2}\right]-22\,C\,\mathrm{Sin}\left[4c+\frac{7dx}{2}\right]\right)\right)$$

- **Problem 276: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]^4}{(a+a\,\mathrm{Cos}[c+dx])^3}\,dx$$

Optimal (type 3, 196 leaves, 9 steps):

$$\frac{(13B-6C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+dx]]}{2a^3d}-\frac{8\,(19B-9C)\,\mathrm{Tan}[c+dx]}{15a^3d}+\frac{(13B-6C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{2a^3d}-$$

$$\frac{(B-C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{5d\,(a+a\,\mathrm{Cos}[c+dx])^3}-\frac{(11B-6C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{15ad\,(a+a\,\mathrm{Cos}[c+dx])^2}-\frac{4\,(19B-9C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{15d\,\left(a^3+a^3\,\mathrm{Cos}[c+dx]\right)}$$

Result (type 3, 684 leaves):

$$\frac{1}{a^3}\left(-\frac{4\,(13\,B-6\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(1+\text{Cos}[c+d\,x])^3}+\right.$$
$$\frac{4\,(13\,B-6\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d\,(1+\text{Cos}[c+d\,x])^3}+\frac{1}{480\,d\,(1+\text{Cos}[c+d\,x])^3}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\left(1235\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-870\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]-3805\,B\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+1830\,C\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]+4329\,B\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-\right.$$
$$2094\,C\,\text{Sin}\left[c-\frac{d\,x}{2}\right]-1989\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+1314\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+3575\,B\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]-1650\,C\,\text{Sin}\left[2\,c+\frac{d\,x}{2}\right]+475\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$
$$450\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-2005\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+1230\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+2275\,B\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-1050\,C\,\text{Sin}\left[3\,c+\frac{3\,d\,x}{2}\right]-$$
$$2673\,B\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]+1278\,C\,\text{Sin}\left[c+\frac{5\,d\,x}{2}\right]-105\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-90\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-1593\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$
$$918\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+975\,B\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-450\,C\,\text{Sin}\left[4\,c+\frac{5\,d\,x}{2}\right]-1325\,B\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]+630\,C\,\text{Sin}\left[2\,c+\frac{7\,d\,x}{2}\right]-$$
$$255\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+60\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-875\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+480\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+195\,B\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-90\,C\,\text{Sin}\left[5\,c+\frac{7\,d\,x}{2}\right]-$$
$$\left.\left.304\,B\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]+144\,C\,\text{Sin}\left[3\,c+\frac{9\,d\,x}{2}\right]-90\,B\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+30\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-214\,B\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+114\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)\right)$$

- **Problem 295: Result more than twice size of optimal antiderivative.**

$$\int \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 27 leaves, 3 steps):

$$B\,x+\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{C\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 95 leaves):

$$B\,x-\frac{A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{A\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}$$

- **Problem 296: Result more than twice size of optimal antiderivative.**

$$\int \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 27 leaves, 3 steps):

$$C\,x+\frac{B\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{A\,\text{Tan}[c+d\,x]}{d}$$

Result (type 3, 84 leaves):

$$C\,x-\frac{B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{A\,\text{Tan}[c+d\,x]}{d}$$

## Problem 297: Result more than twice size of optimal antiderivative.

$$\int\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 51 leaves, 5 steps):

$$\frac{(A+2\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{B\,\text{Tan}[c+d\,x]}{d}+\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 151 leaves):

$$\frac{1}{4\,d}\left(-2\,(A+2\,C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$\left.4\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+4\,B\,\text{Tan}[c+d\,x]\right)$$

## Problem 299: Result more than twice size of optimal antiderivative.

$$\int\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 97 leaves, 6 steps):

$$\frac{(3\,A+4\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{8\,d}+\frac{B\,\text{Tan}[c+d\,x]}{d}+\frac{(3\,A+4\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{8\,d}+\frac{A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}+\frac{B\,\text{Tan}[c+d\,x]^3}{3\,d}$$

Result (type 3, 353 leaves):

$$-\frac{3\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}-\frac{C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+$$
$$\frac{3\,A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\frac{A}{16\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$
$$\frac{3\,A}{16\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{C}{4\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{A}{16\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}-$$
$$\frac{3\,A}{16\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{C}{4\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{2\,B\,\text{Tan}[c+d\,x]}{3\,d}+\frac{B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

## Problem 300: Result more than twice size of optimal antiderivative.

$$\int \left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^6 \, dx$$

Optimal (type 3, 122 leaves, 7 steps):

$$\frac{3 B \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{8 d} + \frac{(4 A + 5 C) \operatorname{Tan}[c + d x]}{5 d} + \frac{3 B \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{8 d} + \frac{B \operatorname{Sec}[c + d x]^3 \operatorname{Tan}[c + d x]}{4 d} + \frac{A \operatorname{Sec}[c + d x]^4 \operatorname{Tan}[c + d x]}{5 d} + \frac{(4 A + 5 C) \operatorname{Tan}[c + d x]^3}{15 d}$$

Result (type 3, 285 leaves):

$$-\frac{3 B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{8 d} + \frac{3 B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right]}{8 d} + \frac{B}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} + \frac{3 B}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{B}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} - \frac{3 B}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{8 A \operatorname{Tan}[c + d x]}{15 d} + \frac{2 C \operatorname{Tan}[c + d x]}{3 d} + \frac{4 A \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{15 d} + \frac{C \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{3 d} + \frac{A \operatorname{Sec}[c + d x]^4 \operatorname{Tan}[c + d x]}{5 d}$$

## Problem 305: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^2 \, dx$$

Optimal (type 3, 46 leaves, 4 steps):

$$a (B + C) x + \frac{a (A + B) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{d} + \frac{a C \operatorname{Sin}[c + d x]}{d} + \frac{a A \operatorname{Tan}[c + d x]}{d}$$

Result (type 3, 187 leaves):

$$a B x + a C x - \frac{a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} - \frac{a B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] - \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right] + \operatorname{Sin}\left[\frac{c}{2} + \frac{d x}{2}\right]\right]}{d} + \frac{a C \operatorname{Cos}[d x] \operatorname{Sin}[c]}{d} + \frac{a C \operatorname{Cos}[c] \operatorname{Sin}[d x]}{d} + \frac{a A \operatorname{Tan}[c + d x]}{d}$$

## Problem 306: Result more than twice size of optimal antiderivative.

$$\int (a + a \operatorname{Cos}[c + d x]) \left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^3 \, dx$$

Optimal (type 3, 62 leaves, 4 steps):

$$a C x + \frac{a (A + 2 (B + C)) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{2 d} + \frac{a (A + B) \operatorname{Tan}[c + d x]}{d} + \frac{a A \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{2 d}$$

Result (type 3, 203 leaves):

$$\frac{1}{4} a \left(4 C x - \frac{2 (A+2 (B+C)) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d} + \frac{2 A \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d} + \frac{4 B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d} + \frac{4 C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d} + \frac{A}{d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} - \frac{A}{d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} + \frac{4 (A+B) \text{Tan}[c+d x]}{d}\right)$$

- **Problem 308: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x]) \left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 125 leaves, 7 steps):

$$\frac{a (3 A+4 (B+C)) \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d} - \frac{a (A+B-3 (A+B+C)) \text{Tan}[c+d x]}{3 d} + \frac{a (3 A+4 (B+C)) \text{Sec}[c+d x] \text{Tan}[c+d x]}{8 d} + \frac{a (A+B) \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d} + \frac{a A \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{4 d}$$

Result (type 3, 545 leaves):

$$-\frac{3 a A \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d} - \frac{a B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d} - \frac{a C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d} + \frac{3 a A \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d} + \frac{a B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d} + \frac{a C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d} + \frac{a A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4} + \frac{3 a A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} + \frac{a B}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} + \frac{a C}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} - \frac{a A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4} - \frac{3 a A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} - \frac{a B}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} - \frac{a C}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} + \frac{2 a A \text{Tan}[c+d x]}{3 d} + \frac{2 a B \text{Tan}[c+d x]}{3 d} + \frac{a C \text{Tan}[c+d x]}{d} + \frac{a A \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d} + \frac{a B \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

- **Problem 314: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+d x])^2 \left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 123 leaves, 6 steps):

$$a^2 (B+2C) x + \frac{a^2 (3A+4B+2C) \text{ArcTanh}[\text{Sin}[c+dx]]}{2d} - \frac{a^2 (3A+2B-2C) \text{Sin}[c+dx]}{2d} + \frac{(A+B) \left(a^2+a^2 \text{Cos}[c+dx]\right) \text{Tan}[c+dx]}{d} + \frac{A (a+a \text{Cos}[c+dx])^2 \text{Sec}[c+dx] \text{Tan}[c+dx]}{2d}$$

Result (type 3, 259 leaves) :

$$\frac{1}{16d} a^2 (1+\text{Cos}[c+dx])^2 \text{Sec}\left[\frac{1}{2}(c+dx)\right]^4 \left(4 (B+2C) (c+dx) - 2 (3A+4B+2C) \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+dx)\right] - \text{Sin}\left[\frac{1}{2}(c+dx)\right]\right] + 2 (3A+4B+2C) \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+dx)\right] + \text{Sin}\left[\frac{1}{2}(c+dx)\right]\right] + \frac{A}{\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right] - \text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2} + \frac{4 (2A+B) \text{Sin}\left[\frac{1}{2}(c+dx)\right]}{\text{Cos}\left[\frac{1}{2}(c+dx)\right] - \text{Sin}\left[\frac{1}{2}(c+dx)\right]} - \frac{A}{\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right] + \text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2} + \frac{4 (2A+B) \text{Sin}\left[\frac{1}{2}(c+dx)\right]}{\text{Cos}\left[\frac{1}{2}(c+dx)\right] + \text{Sin}\left[\frac{1}{2}(c+dx)\right]} + 4 C \text{Sin}[c+dx]\right)$$

- **Problem 315: Result more than twice size of optimal antiderivative.**

$$\int (a+a \text{Cos}[c+dx])^2 \left(A+B \text{Cos}[c+dx]+C \text{Cos}[c+dx]^2\right) \text{Sec}[c+dx]^4 \, dx$$

Optimal (type 3, 134 leaves, 6 steps) :

$$a^2 C x + \frac{a^2 (2A+3B+4C) \text{ArcTanh}[\text{Sin}[c+dx]]}{2d} + \frac{a^2 (2A+3B+2C) \text{Tan}[c+dx]}{2d} + \frac{(2A+3B) \left(a^2+a^2 \text{Cos}[c+dx]\right) \text{Sec}[c+dx] \text{Tan}[c+dx]}{6d} + \frac{A (a+a \text{Cos}[c+dx])^2 \text{Sec}[c+dx]^2 \text{Tan}[c+dx]}{3d}$$

Result (type 3, 639 leaves) :

$$\frac{C\,(c+d\,x)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{4\,d}+\frac{(-2\,A-3\,B-4\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{8\,d}+$$

$$\frac{(2\,A+3\,B+4\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{8\,d}+$$

$$\frac{(7\,A+3\,B)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{24\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{24\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{(-7\,A-3\,B)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(5\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+6\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{12\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(5\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+6\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{12\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

- **Problem 316: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 160 leaves, 8 steps) :

$$\frac{a^2\,(7\,A+8\,B+12\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{a^2\,(4\,A+5\,B+6\,C)\,\mathrm{Tan}[c+d\,x]}{3\,d}+\frac{a^2\,(11\,A+16\,B+12\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{24\,d}+$$

$$\frac{(A+2\,B)\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{6\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 404 leaves) :

$$\frac{1}{192\,d} a^2 (1+\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^4$$
$$\left(-6\,(7\,A+8\,B+12\,C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+6\,(7\,A+8\,B+12\,C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\right.$$
$$\frac{3\,A}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{29\,A+28\,B+12\,C}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{8\,(2\,A+B)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+$$
$$\frac{16\,(4\,A+5\,B+6\,C)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}-\frac{3\,A}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+$$
$$\left.\frac{8\,(2\,A+B)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{-29\,A-4\,(7\,B+3\,C)}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{16\,(4\,A+5\,B+6\,C)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}\right)$$

- **Problem 317: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^2\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 196 leaves, 9 steps):

$$\frac{a^2\,(6\,A+7\,B+8\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{8\,d}+\frac{a^2\,(18\,A+20\,B+25\,C)\,\text{Tan}[c+d\,x]}{15\,d}+$$
$$\frac{a^2\,(6\,A+7\,B+8\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{8\,d}+\frac{a^2\,(18\,A+25\,B+20\,C)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{60\,d}+$$
$$\frac{(2\,A+5\,B)\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{20\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

Result (type 3, 931 leaves):

$$\frac{(-6A-7B-8C)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{32\,d}+$$

$$\frac{(6A+7B+8C)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{32\,d}+$$

$$\frac{(12A+5B)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{320\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{(129A+145B+140C)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{960\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{80\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{80\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+$$

$$\frac{(-12A-5B)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{320\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{(-129A-145B-140C)\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{960\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(39\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+40\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+20\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{480\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(39\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+40\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+20\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{480\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(18\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+20\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+25\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{60\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(18\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+20\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+25\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{60\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

- **Problem 324: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^3\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 169 leaves, 7 steps):

$$a^3\,(B+3C)\,x+\frac{a^3\,(5A+7B+6C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,d}-\frac{5\,a^3\,(A+B)\,\mathrm{Sin}[c+d\,x]}{2\,d}+\frac{(5A+6B+3C)\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Tan}[c+d\,x]}{3\,d}+$$

$$\frac{(A+B)\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 684 leaves):

$$\frac{(B+3C)(c+dx)(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6}{8d}+\frac{(-5A-7B-6C)(a+a\,\text{Cos}[c+dx])^3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6}{16d}+$$

$$\frac{(5A+7B+6C)(a+a\,\text{Cos}[c+dx])^3\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6}{16d}+$$

$$\frac{(10A+3B)(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6}{96d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+\frac{A(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{48d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$

$$\frac{A(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{48d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+\frac{(-10A-3B)(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6}{96d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+$$

$$\frac{(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\left(11A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+9B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+3C\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{24d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+$$

$$\frac{(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\left(11A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+9B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+3C\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{24d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+$$

$$\frac{C(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\,\text{Sin}[c+dx]}{8d}$$

- **Problem 325: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+dx])^3\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^5\,dx$$

Optimal (type 3, 183 leaves, 7 steps) :

$$a^3\,C\,x+\frac{a^3(15A+20B+28C)\,\text{ArcTanh}[\text{Sin}[c+dx]]}{8d}+$$

$$\frac{5a^3(3A+4(B+C))\,\text{Tan}[c+dx]}{8d}+\frac{(15A+20B+12C)\left(a^3+a^3\,\text{Cos}[c+dx]\right)\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{24d}+$$

$$\frac{(3A+4B)\left(a^2+a^2\,\text{Cos}[c+dx]\right)^2\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{12ad}+\frac{A(a+a\,\text{Cos}[c+dx])^3\,\text{Sec}[c+dx]^3\,\text{Tan}[c+dx]}{4d}$$

Result (type 3, 793 leaves) :

$$\frac{C\,(c+d\,x)\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{8\,d}+\frac{(-15\,A-20\,B-28\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{64\,d}+$$

$$\frac{(15\,A+20\,B+28\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{64\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{128\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$

$$\frac{(57\,A+40\,B+12\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{384\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{128\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$

$$\frac{(-57\,A-40\,B-12\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6}{384\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(3\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(3\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(9\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+11\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{24\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\frac{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\left(9\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+11\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{24\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

- **Problem 326: Result more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^3\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 212 leaves, 9 steps):

$$\frac{a^3\,(13\,A+15\,B+20\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{a^3\,(38\,A+45\,B+55\,C)\,\mathrm{Tan}[c+d\,x]}{15\,d}+$$

$$\frac{a^3\,(109\,A+135\,B+140\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{120\,d}+\frac{(11\,A+15\,B+10\,C)\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{30\,d}+$$

$$\frac{(3\,A+5\,B)\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{20\,a\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]}{5\,d}$$

Result (type 3, 931 leaves):

$$\frac{(-13 A-15 B-20 C) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{64 d}+$$

$$\frac{(13 A+15 B+20 C) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{64 d}+$$

$$\frac{(17 A+5 B) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{640 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{(274 A+285 B+200 C) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{1920 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{A (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{160 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^5}+\frac{A (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{160 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^5}+$$

$$\frac{(-17 A-5 B) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{640 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{(-274 A-285 B-200 C) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6}{1920 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{(a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(79 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+60 B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+20 C \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{960 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$

$$\frac{(a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(79 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+60 B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+20 C \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{960 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$

$$\frac{(a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(38 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+45 B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+55 C \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{120 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$

$$\frac{(a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \left(38 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+45 B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+55 C \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{120 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}$$

- **Problem 333: Result more than twice size of optimal antiderivative.**

$$\int (a+a \operatorname{Cos}[c+d x])^4 \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 206 leaves, 8 steps):

$$\frac{1}{2} a^4 (8 A+13 B+12 C) x+\frac{a^4 (13 A+8 B+2 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{2 d}-\frac{5 a^4 (A-B-2 C) \operatorname{Sin}[c+d x]}{2 d}-$$

$$\frac{(15 A+6 B-2 C) \left(a^2+a^2 \operatorname{Cos}[c+d x]\right)^2 \operatorname{Sin}[c+d x]}{6 d}-\frac{(18 A+3 B-8 C) \left(a^4+a^4 \operatorname{Cos}[c+d x]\right) \operatorname{Sin}[c+d x]}{6 d}+$$

$$\frac{a (2 A+B) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Tan}[c+d x]}{d}+\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 3, 610 leaves) :

$$\frac{(8 A+13 B+12 C) (c+d x) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d}+$$
$$\frac{(-13 A-8 B-2 C) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d}+$$
$$\frac{(13 A+8 B+2 C) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{32 d}+\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{64 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}-$$
$$\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8}{64 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{(a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \left(4 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$
$$\frac{(a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \left(4 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{16 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{(4 A+16 B+27 C) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[c+d x]}{64 d}+$$
$$\frac{(B+4 C) (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[2 (c+d x)]}{64 d}+\frac{C (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^8 \operatorname{Sin}[3 (c+d x)]}{192 d}$$

- **Problem 334: Result more than twice size of optimal antiderivative.**

$$\int (a+a \operatorname{Cos}[c+d x])^4 \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 219 leaves, 8 steps) :

$$\frac{1}{2} a^4 (2 A+8 B+13 C) x+\frac{a^4 (12 A+13 B+8 C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{2 d}-\frac{5 a^4 (2 A+B-C) \operatorname{Sin}[c+d x]}{2 d}-$$
$$\frac{(22 A+18 B+3 C) \left(a^4+a^4 \operatorname{Cos}[c+d x]\right) \operatorname{Sin}[c+d x]}{6 d}+\frac{(16 A+15 B+6 C) \left(a^2+a^2 \operatorname{Cos}[c+d x]\right)^2 \operatorname{Tan}[c+d x]}{6 d}+$$
$$\frac{a (4 A+3 B) (a+a \operatorname{Cos}[c+d x])^3 \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{6 d}+\frac{A (a+a \operatorname{Cos}[c+d x])^4 \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 3, 440 leaves) :

$$a^4 \left( \frac{(2 A + 8 B + 13 C)\,(c + d x)}{2 d} + \frac{(-12 A - 13 B - 8 C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] - \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right]}{2 d} + \right.$$

$$\frac{(12 A + 13 B + 8 C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] + \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right]}{2 d} + \frac{13 A + 3 B}{12 d\,\left(\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] - \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right)^2} +$$

$$\frac{A\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right]}{6 d\,\left(\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] - \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right)^3} + \frac{A\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right]}{6 d\,\left(\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] + \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right)^3} +$$

$$\frac{-13 A - 3 B}{12 d\,\left(\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] + \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right)^2} + \frac{20 A\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right] + 12 B\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right] + 3 C\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right]}{3 d\,\left(\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] - \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right)} +$$

$$\left. \frac{20 A\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right] + 12 B\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right] + 3 C\,\text{Sin}\left[\frac{1}{2}\,(c + d x)\right]}{3 d\,\left(\text{Cos}\left[\frac{1}{2}\,(c + d x)\right] + \text{Sin}\left[\frac{1}{2}\,(c + d x)\right]\right)} + \frac{(B + 4 C)\,\text{Sin}[c + d x]}{d} + \frac{C\,\text{Sin}[2\,(c + d x)]}{4 d} \right)$$

- **Problem 335: Result more than twice size of optimal antiderivative.**

$$\int (a + a\,\text{Cos}[c + d x])^4\,\left(A + B\,\text{Cos}[c + d x] + C\,\text{Cos}[c + d x]^2\right)\,\text{Sec}[c + d x]^5\,dx$$

Optimal (type 3, 217 leaves, 8 steps):

$$a^4\,(B + 4 C)\,x + \frac{a^4\,(35 A + 48 B + 52 C)\,\text{ArcTanh}[\text{Sin}[c + d x]]}{8 d} - \frac{5 a^4\,(7 A + 8 B + 4 C)\,\text{Sin}[c + d x]}{8 d} +$$

$$\frac{(35 A + 44 B + 36 C)\,\left(a^4 + a^4\,\text{Cos}[c + d x]\right)\,\text{Tan}[c + d x]}{12 d} + \frac{(7 A + 8 B + 4 C)\,\left(a^2 + a^2\,\text{Cos}[c + d x]\right)^2\,\text{Sec}[c + d x]\,\text{Tan}[c + d x]}{8 d} +$$

$$\frac{a\,(A + B)\,(a + a\,\text{Cos}[c + d x])^3\,\text{Sec}[c + d x]^2\,\text{Tan}[c + d x]}{3 d} + \frac{A\,(a + a\,\text{Cos}[c + d x])^4\,\text{Sec}[c + d x]^3\,\text{Tan}[c + d x]}{4 d}$$

Result (type 3, 838 leaves):

$$\frac{(B+4C)(c+dx)(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{16d}+$$
$$\frac{(-35A-48B-52C)(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{128d}+$$
$$\frac{(35A+48B+52C)(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{128d}+\frac{A(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{256d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^4}+$$
$$\frac{(97A+52B+12C)(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{768d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}-\frac{A(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{256d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^4}+$$
$$\frac{(-97A-52B-12C)(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8}{768d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+\frac{(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\left(4A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{96d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$
$$\frac{(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\left(4A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{96d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$
$$\frac{(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\left(5A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+5B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+3C\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{12d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+$$
$$\frac{(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\left(5A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+5B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+3C\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{12d\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+$$
$$\frac{C(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\,\mathrm{Sin}[c+dx]}{16d}$$

- **Problem 336: Result more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+dx])^4\left(A+B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]^6\,dx$$

Optimal (type 3, 225 leaves, 8 steps):

$$a^4Cx+\frac{a^4(28A+35B+48C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+dx]]}{8d}+\frac{a^4(28A+35B+40C)\,\mathrm{Tan}[c+dx]}{8d}+$$
$$\frac{(28A+35B+32C)\left(a^4+a^4\,\mathrm{Cos}[c+dx]\right)\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{24d}+\frac{(28A+35B+20C)\left(a^2+a^2\,\mathrm{Cos}[c+dx]\right)^2\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{60d}+$$
$$\frac{a(4A+5B)(a+a\,\mathrm{Cos}[c+dx])^3\,\mathrm{Sec}[c+dx]^3\,\mathrm{Tan}[c+dx]}{20d}+\frac{A(a+a\,\mathrm{Cos}[c+dx])^4\,\mathrm{Sec}[c+dx]^4\,\mathrm{Tan}[c+dx]}{5d}$$

Result (type 3, 971 leaves):

$$\frac{C\,(c+d\,x)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{16\,d}+\frac{(-28\,A-35\,B-48\,C)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{128\,d}+$$

$$\frac{(28\,A+35\,B+48\,C)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{128\,d}+$$

$$\frac{(22\,A+5\,B)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{1280\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{(559\,A+485\,B+260\,C)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{3840\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{A\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{320\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{320\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+$$

$$\frac{(-22\,A-5\,B)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{1280\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{(-559\,A-485\,B-260\,C)\,(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8}{3840\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\left(139\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+80\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+20\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{1920\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\left(139\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+80\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+20\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{1920\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\left((a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\left(83\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+100\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+100\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/$$
$$\left(240\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)+$$
$$\left((a+a\,\text{Cos}[c+d\,x])^4\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^8\,\left(83\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+100\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+100\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/$$
$$\left(240\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 339: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 174 leaves, 7 steps):

$$\frac{3\,(4\,A-4\,B+5\,C)\,x}{8\,a}-\frac{(3\,A-4\,B+4\,C)\,\text{Sin}[c+d\,x]}{a\,d}+\frac{3\,(4\,A-4\,B+5\,C)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{8\,a\,d}+$$
$$\frac{(4\,A-4\,B+5\,C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{4\,a\,d}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^4\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}+\frac{(3\,A-4\,B+4\,C)\,\text{Sin}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 393 leaves):

$$\frac{1}{192\,a\,d\,(1+\mathrm{Cos}[c+d\,x])}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(72\,(4\,A-4\,B+5\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+72\,(4\,A-4\,B+5\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]-480\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+552\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-552\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-96\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+168\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-168\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-72\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+144\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-120\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-72\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+144\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-120\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+24\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-16\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+40\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+24\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-16\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+40\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+8\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-5\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+8\,B\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-5\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 340: Result more than twice size of optimal antiderivative.**

$$\int \frac{\mathrm{Cos}[c+d\,x]^2\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 139 leaves, 6 steps):

$$-\frac{(2\,A-3\,B+3\,C)\,x}{2\,a}+\frac{(3\,A-3\,B+4\,C)\,\mathrm{Sin}[c+d\,x]}{a\,d}-\frac{(2\,A-3\,B+3\,C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a\,d}-\frac{(A-B+C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}-\frac{(3\,A-3\,B+4\,C)\,\mathrm{Sin}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 307 leaves):

$$\frac{1}{24\,a\,d\,(1+\mathrm{Cos}[c+d\,x])}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(-12\,(2\,A-3\,B+3\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-12\,(2\,A-3\,B+3\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+60\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-60\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+69\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+12\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-12\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+21\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+12\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+18\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+12\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-9\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+18\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+3\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+3\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-2\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 342: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 54 leaves, 3 steps):

$$\frac{(B-C)\,x}{a}+\frac{C\,\mathrm{Sin}[c+d\,x]}{a\,d}+\frac{(A-B+C)\,\mathrm{Sin}[c+d\,x]}{a\,d\,(1+\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 136 leaves):

$$\frac{1}{2\,a\,d\,(1+\mathrm{Cos}[c+d\,x])}\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\left(2\,(B-C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+2\,(B-C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+\right.$$
$$\left.4\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-4\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+5\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 343: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 51 leaves, 3 steps):

$$\frac{C\,x}{a}+\frac{A\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a\,d}-\frac{(A-B+C)\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 163 leaves):

$$\left(4\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\right.$$
$$\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(C\,d\,x-A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+A\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)-\right.$$
$$\left.\left.(A-B+C)\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)\right)\Big/\left(a\,d\,(1+\mathrm{Cos}[c+d\,x])\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,(c+d\,x)])\right)$$

- **Problem 344: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 71 leaves, 5 steps):

$$-\frac{(A-B)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a\,d}+\frac{(2\,A-B+C)\,\mathrm{Tan}[c+d\,x]}{a\,d}-\frac{(A-B+C)\,\mathrm{Tan}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 256 leaves):

$$\frac{1}{a\,d\,(1+\mathrm{Cos}[c+d\,x])\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,(c+d\,x)])}\,4\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Cos}[c+d\,x]^2\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)$$
$$\left((A-B+C)\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left((A-B)\,\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+\right.\right.$$
$$\left.\left.(A\,\mathrm{Sin}[d\,x])\Big/\left(\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\right)\right)$$

- **Problem 345: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 117 leaves, 6 steps):

$$\frac{(3\,A-2\,B+2\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a\,d}-\frac{(2\,A-2\,B+C)\,\mathrm{Tan}[c+d\,x]}{a\,d}+\frac{(3\,A-2\,B+2\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}-\frac{(A-B+C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 256 leaves):

$$\frac{1}{2\,a\,d\,(1+\mathrm{Cos}[c+d\,x])}$$
$$\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\left(-2\,(3\,A-2\,B+2\,C)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,(3\,A-2\,B+2\,C)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$\frac{A}{\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,(-A+B)\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-$$
$$\left.\frac{A}{\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,(-A+B)\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-4\,(A-B+C)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 346: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 148 leaves, 6 steps):

$$-\frac{(3\,A-3\,B+2\,C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a\,d}+\frac{(4\,A-3\,B+3\,C)\,\mathrm{Tan}[c+d\,x]}{a\,d}-$$
$$\frac{(3\,A-3\,B+2\,C)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}-\frac{(A-B+C)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}+\frac{(4\,A-3\,B+3\,C)\,\mathrm{Tan}[c+d\,x]^3}{3\,a\,d}$$

Result (type 3, 673 leaves):

$$\frac{(3A-3B+2C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]}{d\,(a+a\,\text{Cos}[c+dx])}+\frac{(-3A+3B-2C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]}{d\,(a+a\,\text{Cos}[c+dx])}+$$

$$\frac{(-2A+3B)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2}{6d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+\frac{(2A-3B)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2}{6d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]\left(A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]-B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+C\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{d\,(a+a\,\text{Cos}[c+dx])}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(5A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]-3B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+3C\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+$$

$$\frac{2\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(5A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]-3B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+3C\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{3d\,(a+a\,\text{Cos}[c+dx])\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}$$

## Problem 347: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Cos}[c+dx]^3\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{(a+a\,\text{Cos}[c+dx])^2}\,dx$$

Optimal (type 3, 185 leaves, 7 steps):

$$-\frac{(4A-7B+10C)\,x}{2a^2}+\frac{(5A-8B+12C)\,\text{Sin}[c+dx]}{a^2 d}-\frac{(4A-7B+10C)\,\text{Cos}[c+dx]\,\text{Sin}[c+dx]}{2a^2 d}-$$

$$\frac{(4A-7B+10C)\,\text{Cos}[c+dx]^3\,\text{Sin}[c+dx]}{3a^2 d\,(1+\text{Cos}[c+dx])}-\frac{(A-B+C)\,\text{Cos}[c+dx]^4\,\text{Sin}[c+dx]}{3d\,(a+a\,\text{Cos}[c+dx])^2}-\frac{(5A-8B+12C)\,\text{Sin}[c+dx]^3}{3a^2 d}$$

Result (type 3, 481 leaves):

$$\frac{1}{48\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(-36\,(4\,A-7\,B+10\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]-36\,(4\,A-7\,B+10\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]-48\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$84\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-120\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-48\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+84\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-120\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$264\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-381\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+516\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]-120\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+147\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-156\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+164\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$
$$239\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+342\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+36\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-63\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+118\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$12\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-15\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+30\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+12\,A\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-15\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+30\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$
$$\left.3\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-3\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-3\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

- **Problem 348: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^2\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 160 leaves, 3 steps) :

$$\frac{(2\,A-4\,B+7\,C)\,x}{2\,a^2}-\frac{2\,(2\,A-5\,B+8\,C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d}+\frac{(2\,A-4\,B+7\,C)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,a^2\,d}-$$
$$\frac{(2\,A-5\,B+8\,C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 385 leaves) :

$$\frac{1}{48\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(36\,(2\,A-4\,B+7\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+36\,(2\,A-4\,B+7\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+24\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-48\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$84\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+24\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-48\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+84\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-144\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$264\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-381\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+96\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-120\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+147\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-80\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+$$
$$164\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-239\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+36\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-63\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+12\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$
$$\left.15\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+12\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-15\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+3\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+3\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

### Problem 349: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right)}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 103 leaves, 6 steps):

$$\frac{(B-2 C) x}{a^2}+\frac{(A-B+4 C) \text{Sin}[c+d x]}{3 a^2 d}-\frac{(B-2 C) \text{Sin}[c+d x]}{a^2 d (1+\text{Cos}[c+d x])}-\frac{(A-B+C) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 275 leaves):

$$\frac{1}{12 a^2 d (1+\text{Cos}[c+d x])^2}$$
$$\text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Sec}\left[\frac{c}{2}\right] \left(18 (B-2 C) d x \text{Cos}\left[\frac{d x}{2}\right]+18 (B-2 C) d x \text{Cos}\left[c+\frac{d x}{2}\right]+6 B d x \text{Cos}\left[c+\frac{3 d x}{2}\right]-12 C d x \text{Cos}\left[c+\frac{3 d x}{2}\right]+\right.$$
$$6 B d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]-12 C d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]+12 A \text{Sin}\left[\frac{d x}{2}\right]-36 B \text{Sin}\left[\frac{d x}{2}\right]+66 C \text{Sin}\left[\frac{d x}{2}\right]-12 A \text{Sin}\left[c+\frac{d x}{2}\right]+24 B \text{Sin}\left[c+\frac{d x}{2}\right]-$$
$$\left.30 C \text{Sin}\left[c+\frac{d x}{2}\right]+8 A \text{Sin}\left[c+\frac{3 d x}{2}\right]-20 B \text{Sin}\left[c+\frac{3 d x}{2}\right]+41 C \text{Sin}\left[c+\frac{3 d x}{2}\right]+9 C \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+3 C \text{Sin}\left[2 c+\frac{5 d x}{2}\right]+3 C \text{Sin}\left[3 c+\frac{5 d x}{2}\right]\right)$$

### Problem 350: Result more than twice size of optimal antiderivative.

$$\int \frac{A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 72 leaves, 3 steps):

$$\frac{C x}{a^2}+\frac{(A+2 B-5 C) \text{Sin}[c+d x]}{3 a^2 d (1+\text{Cos}[c+d x])}+\frac{(A-B+C) \text{Sin}[c+d x]}{3 d (a+a \text{Cos}[c+d x])^2}$$

Result (type 3, 175 leaves):

$$\frac{1}{24 a^2 d}$$
$$\text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{1}{2} (c+d x)\right]^3 \left(9 C d x \text{Cos}\left[\frac{d x}{2}\right]+9 C d x \text{Cos}\left[c+\frac{d x}{2}\right]+3 C d x \text{Cos}\left[c+\frac{3 d x}{2}\right]+3 C d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]+6 A \text{Sin}\left[\frac{d x}{2}\right]+6 B \text{Sin}\left[\frac{d x}{2}\right]-\right.$$
$$\left.18 C \text{Sin}\left[\frac{d x}{2}\right]-6 B \text{Sin}\left[c+\frac{d x}{2}\right]+12 C \text{Sin}\left[c+\frac{d x}{2}\right]+2 A \text{Sin}\left[c+\frac{3 d x}{2}\right]+4 B \text{Sin}\left[c+\frac{3 d x}{2}\right]-10 C \text{Sin}\left[c+\frac{3 d x}{2}\right]\right)$$

### Problem 351: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{(a+a \text{Cos}[c+d x])^2} \, dx$$

Optimal (type 3, 83 leaves, 4 steps):

$$\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}-\frac{(4\,A-B-2\,C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 221 leaves):

$$-\left(\left(4\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\right.\right.$$
$$\left(6\,A\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+\right.$$
$$\left.\left.(A-B+C)\,\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+2\,(4\,A-B-2\,C)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+(A-B+C)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Tan}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left.\left(3\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,(c+d\,x)])\right)\right)$$

- **Problem 352: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 109 leaves, 6 steps):

$$-\frac{(2\,A-B)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}+\frac{(10\,A-4\,B+C)\,\text{Tan}[c+d\,x]}{3\,a^2\,d}-\frac{(2\,A-B)\,\text{Tan}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B+C)\,\text{Tan}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 3, 321 leaves):

$$\frac{1}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,(c+d\,x)])}\,4\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Cos}[c+d\,x]^2$$
$$\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\left((A-B+C)\,\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+2\,(7\,A-4\,B+C)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]+\right.$$
$$6\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left((2\,A-B)\left(\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)+\right.$$
$$\left.(A\,\text{Sin}[d\,x])\Big/\left(\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\right)+$$
$$\left.(A-B+C)\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Tan}\left[\frac{c}{2}\right]\right)$$

- **Problem 353: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 165 leaves, 7 steps):

$$\frac{(7A-4B+2C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+dx]]}{2a^2 d}-\frac{2(8A-5B+2C)\,\mathrm{Tan}[c+dx]}{3a^2 d}+\frac{(7A-4B+2C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{2a^2 d}-\frac{(8A-5B+2C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{3a^2 d\,(1+\mathrm{Cos}[c+dx])}-\frac{(A-B+C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{3d\,(a+a\,\mathrm{Cos}[c+dx])^2}$$

Result (type 3, 578 leaves):

$$-\frac{2(7A-4B+2C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+dx])^2}+\frac{2(7A-4B+2C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+dx])^2}+$$

$$\frac{A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4}{d\,(a+a\,\mathrm{Cos}[c+dx])^2\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}-\frac{A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4}{d\,(a+a\,\mathrm{Cos}[c+dx])^2\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}-$$

$$\frac{4\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\left(2A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]-B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{d\,(a+a\,\mathrm{Cos}[c+dx])^2\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}-\frac{4\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\left(2A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]-B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{d\,(a+a\,\mathrm{Cos}[c+dx])^2\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}-$$

$$\frac{2\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Sec}\left[\frac{1}{2}(c+dx)\right]^3\left(A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]-B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+C\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{3d\,(a+a\,\mathrm{Cos}[c+dx])^2}-$$

$$\frac{4\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\mathrm{Sec}\left[\frac{1}{2}(c+dx)\right]\left(10A\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]-7B\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]+4C\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{3d\,(a+a\,\mathrm{Cos}[c+dx])^2}$$

- **Problem 354: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]^4}{(a+a\,\mathrm{Cos}[c+dx])^2}\,dx$$

Optimal (type 3, 194 leaves, 7 steps):

$$-\frac{(10A-7B+4C)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+dx]]}{2a^2 d}+\frac{(12A-8B+5C)\,\mathrm{Tan}[c+dx]}{a^2 d}-\frac{(10A-7B+4C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{2a^2 d}-\frac{(10A-7B+4C)\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{3a^2 d\,(1+\mathrm{Cos}[c+dx])}-\frac{(A-B+C)\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{3d\,(a+a\,\mathrm{Cos}[c+dx])^2}+\frac{(12A-8B+5C)\,\mathrm{Tan}[c+dx]^3}{3a^2 d}$$

Result (type 3, 763 leaves):

$$\frac{2\,(10\,A-7\,B+4\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-$$
$$\frac{2\,(10\,A-7\,B+4\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+$$
$$\frac{(-5\,A+3\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$
$$\frac{2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{(5\,A-3\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{2\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\left(A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+$$
$$\frac{4\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(11\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-6\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$
$$\frac{4\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(11\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-6\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$
$$\frac{4\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(13\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-10\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+7\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

- **Problem 355: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^4\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 237 leaves, 8 steps):

$$-\frac{(6\,A-13\,B+23\,C)\,x}{2\,a^3}+\frac{4\,(9\,A-19\,B+34\,C)\,\mathrm{Sin}[c+d\,x]}{5\,a^3\,d}-\frac{(6\,A-13\,B+23\,C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a^3\,d}-\frac{(A-B+C)\,\mathrm{Cos}[c+d\,x]^5\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}-$$
$$\frac{(3\,A-8\,B+13\,C)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(6\,A-13\,B+23\,C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{3\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}-\frac{4\,(9\,A-19\,B+34\,C)\,\mathrm{Sin}[c+d\,x]^3}{15\,a^3\,d}$$

Result (type 3, 663 leaves):

$$\frac{1}{480\,a^3\,d\,(1+\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(-600\,(6\,A-13\,B+23\,C)\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]-600\,(6\,A-13\,B+23\,C)\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]-1800\,A\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$3900\,B\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]-6900\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]-1800\,A\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+3900\,B\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-6900\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-$$
$$360\,A\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+780\,B\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-1380\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-360\,A\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+780\,B\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-$$
$$1380\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+7020\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-12\,760\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+20\,410\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-4500\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+7560\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-$$
$$11\,110\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+4860\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9230\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+15\,380\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-900\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$930\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-380\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+1452\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2782\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+4777\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+$$
$$300\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-750\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+1625\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+60\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-105\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+$$
$$230\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+60\,A\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-105\,B\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+230\,C\,\mathrm{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,B\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]-$$
$$\left.20\,C\,\mathrm{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+15\,B\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]-20\,C\,\mathrm{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]+5\,C\,\mathrm{Sin}\left[5\,c+\frac{11\,d\,x}{2}\right]+5\,C\,\mathrm{Sin}\left[6\,c+\frac{11\,d\,x}{2}\right]\right)$$

- **Problem 356: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^3\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 207 leaves, 4 steps) :

$$\frac{(2\,A-6\,B+13\,C)\,x}{2\,a^3}-\frac{2\,(11\,A-36\,B+76\,C)\,\mathrm{Sin}[c+d\,x]}{15\,a^3\,d}+\frac{(2\,A-6\,B+13\,C)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{2\,a^3\,d}-$$
$$\frac{(A-B+C)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}-\frac{(A-6\,B+11\,C)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(11\,A-36\,B+76\,C)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]}{15\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 3, 565 leaves) :

$$\frac{1}{480\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(600\,(2\,A-6\,B+13\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+600\,(2\,A-6\,B+13\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+600\,A\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-\right.$$
$$1800\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+3900\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+600\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-1800\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+3900\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$120\,A\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-360\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+780\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+120\,A\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-360\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$
$$780\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-2960\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+7020\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]-12\,760\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]+2160\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-4500\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+$$
$$7560\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-1840\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+4860\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-9230\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+720\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-900\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$930\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-512\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+1452\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-2782\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+300\,B\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]-750\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+$$
$$\left.60\,B\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-105\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+60\,B\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]-105\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[4\,c+\frac{9\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[5\,c+\frac{9\,d\,x}{2}\right]\right)$$

## Problem 357: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Cos}[c+d\,x]^2\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 152 leaves, 7 steps):

$$\frac{(B-3\,C)\,x}{a^3}+\frac{(2\,A-7\,B+27\,C)\,\text{Sin}[c+d\,x]}{15\,a^3\,d}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{(A+4\,B-9\,C)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(B-3\,C)\,\text{Sin}[c+d\,x]}{d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 3, 423 leaves):

$$\frac{1}{120\,a^3\,d\,(1+\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}\left[\frac{c}{2}\right]\left(300\,(B-3\,C)\,d\,x\,\text{Cos}\left[\frac{d\,x}{2}\right]+300\,(B-3\,C)\,d\,x\,\text{Cos}\left[c+\frac{d\,x}{2}\right]+150\,B\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]-450\,C\,d\,x\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]+\right.$$
$$150\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]-450\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+30\,B\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]-90\,C\,d\,x\,\text{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+30\,B\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]-$$
$$90\,C\,d\,x\,\text{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+160\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-740\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+1755\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]-120\,A\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+540\,B\,\text{Sin}\left[c+\frac{d\,x}{2}\right]-1125\,C\,\text{Sin}\left[c+\frac{d\,x}{2}\right]+$$
$$80\,A\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-460\,B\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+1215\,C\,\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]-60\,A\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+180\,B\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-225\,C\,\text{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+$$
$$\left.28\,A\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-128\,B\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+363\,C\,\text{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+75\,C\,\text{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+15\,C\,\text{Sin}\left[4\,c+\frac{7\,d\,x}{2}\right]\right)$$

## Problem 358: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x] \left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right)}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 123 leaves, 5 steps):

$$\frac{C x}{a^3}-\frac{(A-B+C) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{(3 A+2 B-7 C) \text{Sin}[c+d x]}{15 a d (a+a \text{Cos}[c+d x])^2}+\frac{(6 A+4 B-29 C) \text{Sin}[c+d x]}{15 d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 289 leaves):

$$\frac{1}{480 a^3 d} \text{Sec}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{1}{2} (c+d x)\right]^5 \left(150 C d x \text{Cos}\left[\frac{d x}{2}\right]+150 C d x \text{Cos}\left[c+\frac{d x}{2}\right]+75 C d x \text{Cos}\left[c+\frac{3 d x}{2}\right]+75 C d x \text{Cos}\left[2 c+\frac{3 d x}{2}\right]+15 C d x \text{Cos}\left[2 c+\frac{5 d x}{2}\right]+15 C d x \text{Cos}\left[3 c+\frac{5 d x}{2}\right]+30 A \text{Sin}\left[\frac{d x}{2}\right]+80 B \text{Sin}\left[\frac{d x}{2}\right]-370 C \text{Sin}\left[\frac{d x}{2}\right]-30 A \text{Sin}\left[c+\frac{d x}{2}\right]-60 B \text{Sin}\left[c+\frac{d x}{2}\right]+270 C \text{Sin}\left[c+\frac{d x}{2}\right]+30 A \text{Sin}\left[c+\frac{3 d x}{2}\right]+40 B \text{Sin}\left[c+\frac{3 d x}{2}\right]-230 C \text{Sin}\left[c+\frac{3 d x}{2}\right]-30 B \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+90 C \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+6 A \text{Sin}\left[2 c+\frac{5 d x}{2}\right]+14 B \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-64 C \text{Sin}\left[2 c+\frac{5 d x}{2}\right]\right)$$

## Problem 360: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{(a+a \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 124 leaves, 5 steps):

$$\frac{A \text{ArcTanh}[\text{Sin}[c+d x]]}{a^3 d}-\frac{(A-B+C) \text{Sin}[c+d x]}{5 d (a+a \text{Cos}[c+d x])^3}-\frac{(7 A-2 B-3 C) \text{Sin}[c+d x]}{15 a d (a+a \text{Cos}[c+d x])^2}-\frac{(22 A-2 B-3 C) \text{Sin}[c+d x]}{15 d \left(a^3+a^3 \text{Cos}[c+d x]\right)}$$

Result (type 3, 276 leaves):

$$-\left(\left(\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \left(240 A \text{Cos}\left[\frac{1}{2} (c+d x)\right]^6 \left(\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right)+\text{Cos}\left[\frac{1}{2} (c+d x)\right] \text{Sec}\left[\frac{c}{2}\right] \left(5 (29 A-4 B-3 C) \text{Sin}\left[\frac{d x}{2}\right]+15 (-5 A+C) \text{Sin}\left[c+\frac{d x}{2}\right]+95 A \text{Sin}\left[c+\frac{3 d x}{2}\right]-10 B \text{Sin}\left[c+\frac{3 d x}{2}\right]-15 C \text{Sin}\left[c+\frac{3 d x}{2}\right]-15 A \text{Sin}\left[2 c+\frac{3 d x}{2}\right]+22 A \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-2 B \text{Sin}\left[2 c+\frac{5 d x}{2}\right]-3 C \text{Sin}\left[2 c+\frac{5 d x}{2}\right]\right)\right)\right)\Big/\left(15 a^3 d (1+\text{Cos}[c+d x])^3 (2 A+C+2 B \text{Cos}[c+d x]+C \text{Cos}[2 (c+d x)])\right)\right)$$

## Problem 361: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B\cos[c+d x]+C\cos[c+d x]^2\right)\sec[c+d x]^2}{(a+a\cos[c+d x])^3}\,dx$$

Optimal (type 3, 150 leaves, 7 steps):

$$-\frac{(3A-B)\,\text{ArcTanh}[\sin[c+d x]]}{a^3 d}+\frac{2\,(36A-11B+C)\tan[c+d x]}{15a^3 d}-\frac{(A-B+C)\tan[c+d x]}{5d\,(a+a\cos[c+d x])^3}-\frac{(9A-4B-C)\tan[c+d x]}{15a d\,(a+a\cos[c+d x])^2}-\frac{(3A-B)\tan[c+d x]}{d\left(a^3+a^3\cos[c+d x]\right)}$$

Result (type 3, 839 leaves):

$$\frac{1}{a^3}\Bigg(\Bigg(16\,(3A-B)\cos\left[\frac{c}{2}+\frac{d x}{2}\right]^6\cos[c+d x]^2\,\text{Log}\left[\cos\left[\frac{c}{2}+\frac{d x}{2}\right]-\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\left(C+B\sec[c+d x]+A\sec[c+d x]^2\right)\Bigg)\Big/$$
$$\left(d\,(1+\cos[c+d x])^3\,(2A+C+2B\cos[c+d x]+C\cos[2c+2d x])\right)-$$
$$\left(16\,(3A-B)\cos\left[\frac{c}{2}+\frac{d x}{2}\right]^6\cos[c+d x]^2\,\text{Log}\left[\cos\left[\frac{c}{2}+\frac{d x}{2}\right]+\sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right]\left(C+B\sec[c+d x]+A\sec[c+d x]^2\right)\right)\Big/$$
$$\left(d\,(1+\cos[c+d x])^3\,(2A+C+2B\cos[c+d x]+C\cos[2c+2d x])\right)+$$
$$\frac{1}{60d\,(1+\cos[c+d x])^3\,(2A+C+2B\cos[c+d x]+C\cos[2c+2d x])}\cos\left[\frac{c}{2}+\frac{d x}{2}\right]\cos[c+d x]\sec\left[\frac{c}{2}\right]\sec[c]$$
$$\left(C+B\sec[c+d x]+A\sec[c+d x]^2\right)\Bigg(-255A\sin\left[\frac{d x}{2}\right]+160B\sin\left[\frac{d x}{2}\right]-20C\sin\left[\frac{d x}{2}\right]+567A\sin\left[\frac{3d x}{2}\right]-167B\sin\left[\frac{3d x}{2}\right]+$$
$$22C\sin\left[\frac{3d x}{2}\right]-600A\sin\left[c-\frac{d x}{2}\right]+170B\sin\left[c-\frac{d x}{2}\right]-10C\sin\left[c-\frac{d x}{2}\right]+375A\sin\left[c+\frac{d x}{2}\right]-170B\sin\left[c+\frac{d x}{2}\right]+$$
$$10C\sin\left[c+\frac{d x}{2}\right]-480A\sin\left[2c+\frac{d x}{2}\right]+160B\sin\left[2c+\frac{d x}{2}\right]-20C\sin\left[2c+\frac{d x}{2}\right]-60A\sin\left[c+\frac{3d x}{2}\right]+75B\sin\left[c+\frac{3d x}{2}\right]+$$
$$402A\sin\left[2c+\frac{3d x}{2}\right]-167B\sin\left[2c+\frac{3d x}{2}\right]+22C\sin\left[2c+\frac{3d x}{2}\right]-225A\sin\left[3c+\frac{3d x}{2}\right]+75B\sin\left[3c+\frac{3d x}{2}\right]+$$
$$315A\sin\left[c+\frac{5d x}{2}\right]-95B\sin\left[c+\frac{5d x}{2}\right]+10C\sin\left[c+\frac{5d x}{2}\right]+30A\sin\left[2c+\frac{5d x}{2}\right]+15B\sin\left[2c+\frac{5d x}{2}\right]+240A\sin\left[3c+\frac{5d x}{2}\right]-$$
$$95B\sin\left[3c+\frac{5d x}{2}\right]+10C\sin\left[3c+\frac{5d x}{2}\right]-45A\sin\left[4c+\frac{5d x}{2}\right]+15B\sin\left[4c+\frac{5d x}{2}\right]+72A\sin\left[2c+\frac{7d x}{2}\right]-$$
$$22B\sin\left[2c+\frac{7d x}{2}\right]+2C\sin\left[2c+\frac{7d x}{2}\right]+15A\sin\left[3c+\frac{7d x}{2}\right]+57A\sin\left[4c+\frac{7d x}{2}\right]-22B\sin\left[4c+\frac{7d x}{2}\right]+2C\sin\left[4c+\frac{7d x}{2}\right]\Bigg)\Bigg)$$

## Problem 365: Result more than twice size of optimal antiderivative.

$$\int \frac{\cos[c+d x]^3\left(A+B\cos[c+d x]+C\cos[c+d x]^2\right)}{(a+a\cos[c+d x])^4}\,dx$$

Optimal (type 3, 195 leaves, 8 steps):

$$\frac{(B-4C)\,x}{a^4}+\frac{(6A-55B+244C)\,\mathrm{Sin}[c+d x]}{105\,a^4\,d}+\frac{(3A+25B-88C)\,\mathrm{Cos}[c+d x]^2\,\mathrm{Sin}[c+d x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d x])^2}-\frac{(B-4C)\,\mathrm{Sin}[c+d x]}{a^4\,d\,(1+\mathrm{Cos}[c+d x])}-\frac{(A-B+C)\,\mathrm{Cos}[c+d x]^4\,\mathrm{Sin}[c+d x]}{7\,d\,(a+a\,\mathrm{Cos}[c+d x])^4}+\frac{(2A+5B-12C)\,\mathrm{Cos}[c+d x]^3\,\mathrm{Sin}[c+d x]}{35\,a\,d\,(a+a\,\mathrm{Cos}[c+d x])^3}$$

Result (type 3, 571 leaves):

$$\frac{1}{1680\,a^4\,d\,(1+\mathrm{Cos}[c+d x])^4}\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(7350\,(B-4C)\,d x\,\mathrm{Cos}\left[\frac{d x}{2}\right]+7350\,(B-4C)\,d x\,\mathrm{Cos}\left[c+\frac{d x}{2}\right]+4410\,B\,d x\,\mathrm{Cos}\left[c+\frac{3 d x}{2}\right]-17640\,C\,d x\,\mathrm{Cos}\left[c+\frac{3 d x}{2}\right]+4410\,B\,d x\,\mathrm{Cos}\left[2c+\frac{3 d x}{2}\right]-17640\,C\,d x\,\mathrm{Cos}\left[2c+\frac{3 d x}{2}\right]+1470\,B\,d x\,\mathrm{Cos}\left[2c+\frac{5 d x}{2}\right]-5880\,C\,d x\,\mathrm{Cos}\left[2c+\frac{5 d x}{2}\right]+1470\,B\,d x\,\mathrm{Cos}\left[3c+\frac{5 d x}{2}\right]-5880\,C\,d x\,\mathrm{Cos}\left[3c+\frac{5 d x}{2}\right]+210\,B\,d x\,\mathrm{Cos}\left[3c+\frac{7 d x}{2}\right]-840\,C\,d x\,\mathrm{Cos}\left[3c+\frac{7 d x}{2}\right]+210\,B\,d x\,\mathrm{Cos}\left[4c+\frac{7 d x}{2}\right]-840\,C\,d x\,\mathrm{Cos}\left[4c+\frac{7 d x}{2}\right]+2520\,A\,\mathrm{Sin}\left[\frac{d x}{2}\right]-19880\,B\,\mathrm{Sin}\left[\frac{d x}{2}\right]+60830\,C\,\mathrm{Sin}\left[\frac{d x}{2}\right]-2520\,A\,\mathrm{Sin}\left[c+\frac{d x}{2}\right]+16520\,B\,\mathrm{Sin}\left[c+\frac{d x}{2}\right]-46130\,C\,\mathrm{Sin}\left[c+\frac{d x}{2}\right]+1764\,A\,\mathrm{Sin}\left[c+\frac{3 d x}{2}\right]-14280\,B\,\mathrm{Sin}\left[c+\frac{3 d x}{2}\right]+46116\,C\,\mathrm{Sin}\left[c+\frac{3 d x}{2}\right]-1260\,A\,\mathrm{Sin}\left[2c+\frac{3 d x}{2}\right]+7560\,B\,\mathrm{Sin}\left[2c+\frac{3 d x}{2}\right]-18060\,C\,\mathrm{Sin}\left[2c+\frac{3 d x}{2}\right]+588\,A\,\mathrm{Sin}\left[2c+\frac{5 d x}{2}\right]-5600\,B\,\mathrm{Sin}\left[2c+\frac{5 d x}{2}\right]+19292\,C\,\mathrm{Sin}\left[2c+\frac{5 d x}{2}\right]-420\,A\,\mathrm{Sin}\left[3c+\frac{5 d x}{2}\right]+1680\,B\,\mathrm{Sin}\left[3c+\frac{5 d x}{2}\right]-2100\,C\,\mathrm{Sin}\left[3c+\frac{5 d x}{2}\right]+144\,A\,\mathrm{Sin}\left[3c+\frac{7 d x}{2}\right]-1040\,B\,\mathrm{Sin}\left[3c+\frac{7 d x}{2}\right]+3791\,C\,\mathrm{Sin}\left[3c+\frac{7 d x}{2}\right]+735\,C\,\mathrm{Sin}\left[4c+\frac{7 d x}{2}\right]+105\,C\,\mathrm{Sin}\left[4c+\frac{9 d x}{2}\right]+105\,C\,\mathrm{Sin}\left[5c+\frac{9 d x}{2}\right]\right)$$

- **Problem 366: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d x]^2\,\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)}{(a+a\,\mathrm{Cos}[c+d x])^4}\,dx$$

Optimal (type 3, 164 leaves, 6 steps):

$$\frac{C x}{a^4}-\frac{(8A+6B-55C)\,\mathrm{Sin}[c+d x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d x])^2}+\frac{(16A+12B-215C)\,\mathrm{Sin}[c+d x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d x])}-\frac{(A-B+C)\,\mathrm{Cos}[c+d x]^3\,\mathrm{Sin}[c+d x]}{7\,d\,(a+a\,\mathrm{Cos}[c+d x])^4}+\frac{(4A+3B-10C)\,\mathrm{Cos}[c+d x]^2\,\mathrm{Sin}[c+d x]}{35\,a\,d\,(a+a\,\mathrm{Cos}[c+d x])^3}$$

Result (type 3, 405 leaves):

$$\frac{1}{13\,440\,a^4\,d}\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^7$$
$$\left(3675\,C\,d\,x\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]+3675\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]+2205\,C\,d\,x\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]+2205\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{3\,d\,x}{2}\right]+735\,C\,d\,x\,\mathrm{Cos}\left[2\,c+\frac{5\,d\,x}{2}\right]+\right.$$
$$735\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{5\,d\,x}{2}\right]+105\,C\,d\,x\,\mathrm{Cos}\left[3\,c+\frac{7\,d\,x}{2}\right]+105\,C\,d\,x\,\mathrm{Cos}\left[4\,c+\frac{7\,d\,x}{2}\right]+560\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+1260\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-9940\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-$$
$$350\,A\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]-1260\,B\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+8260\,C\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+336\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]+882\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-7140\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-$$
$$210\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]-630\,B\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+3780\,C\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+182\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]+294\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$
$$\left.2800\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-210\,B\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+840\,C\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+26\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]+72\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-520\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]\right)$$

- **Problem 369: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]}{(a+a\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 157 leaves, 6 steps):

$$\frac{A\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a^4\,d}-\frac{(55\,A-6\,B-8\,C)\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])^2}-\frac{2\,(80\,A-3\,B-4\,C)\,\mathrm{Sin}[c+d\,x]}{105\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A-B+C)\,\mathrm{Sin}[c+d\,x]}{7\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^4}-\frac{(10\,A-3\,B-4\,C)\,\mathrm{Sin}[c+d\,x]}{35\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$

Result (type 3, 334 leaves):

$$-\left(\left(\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\right.\right.$$
$$\left(6720\,A\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^8\left(\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]-\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)+\right.$$
$$\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\left(70\,(49\,A-3\,B-2\,C)\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-70\,(31\,A-2\,C)\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+2625\,A\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-\right.$$
$$126\,B\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-168\,C\,\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]-735\,A\,\mathrm{Sin}\left[2\,c+\frac{3\,d\,x}{2}\right]+1015\,A\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-42\,B\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-$$
$$\left.\left.\left.56\,C\,\mathrm{Sin}\left[2\,c+\frac{5\,d\,x}{2}\right]-105\,A\,\mathrm{Sin}\left[3\,c+\frac{5\,d\,x}{2}\right]+160\,A\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-6\,B\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]-8\,C\,\mathrm{Sin}\left[3\,c+\frac{7\,d\,x}{2}\right]\right)\right)\right)\Big/$$
$$\left.\left(210\,a^4\,d\,(1+\mathrm{Cos}[c+d\,x])^4\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,(c+d\,x)])\right)\right)$$

- **Problem 370: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2}{(a+a\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 185 leaves, 8 steps):

$$-\frac{(4A-B)\,\text{ArcTanh}[\text{Sin}[c+dx]]}{a^4 d}+\frac{2\,(332A-80B+3C)\,\text{Tan}[c+dx]}{105\,a^4 d}-\frac{(88A-25B-3C)\,\text{Tan}[c+dx]}{105\,a^4 d\,(1+\text{Cos}[c+dx])^2}-\frac{(4A-B)\,\text{Tan}[c+dx]}{a^4 d\,(1+\text{Cos}[c+dx])}-\frac{(A-B+C)\,\text{Tan}[c+dx]}{7\,d\,(a+a\,\text{Cos}[c+dx])^4}-\frac{(12A-5B-2C)\,\text{Tan}[c+dx]}{35\,a\,d\,(a+a\,\text{Cos}[c+dx])^3}$$

Result (type 3, 1190 leaves) :

$$\frac{1}{a^4}\left(\left(32\,(4A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\text{Cos}[c+dx]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\right)\Big/\right.$$
$$\left(d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)-$$
$$\left(32\,(4A-B)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\text{Cos}[c+dx]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\right)\Big/$$
$$\left(d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(4\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(A\,\text{Sin}\left[\frac{c}{2}\right]-B\,\text{Sin}\left[\frac{c}{2}\right]+C\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(7\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(8\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(17A\,\text{Sin}\left[\frac{c}{2}\right]-10B\,\text{Sin}\left[\frac{c}{2}\right]+3C\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(35\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(16\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^6\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(139A\,\text{Sin}\left[\frac{c}{2}\right]-55B\,\text{Sin}\left[\frac{c}{2}\right]+6C\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(105\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(4\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(A\,\text{Sin}\left[\frac{dx}{2}\right]-B\,\text{Sin}\left[\frac{dx}{2}\right]+C\,\text{Sin}\left[\frac{dx}{2}\right]\right)\right)\Big/$$
$$\left(7\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(8\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(17A\,\text{Sin}\left[\frac{dx}{2}\right]-10B\,\text{Sin}\left[\frac{dx}{2}\right]+3C\,\text{Sin}\left[\frac{dx}{2}\right]\right)\right)\Big/$$
$$\left(35\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(32\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^7\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(559A\,\text{Sin}\left[\frac{dx}{2}\right]-160B\,\text{Sin}\left[\frac{dx}{2}\right]+6C\,\text{Sin}\left[\frac{dx}{2}\right]\right)\right)\Big/$$
$$\left(105\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left(16\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\text{Cos}[c+dx]^2\,\text{Sec}\left[\frac{c}{2}\right]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\left(139A\,\text{Sin}\left[\frac{dx}{2}\right]-55B\,\text{Sin}\left[\frac{dx}{2}\right]+6C\,\text{Sin}\left[\frac{dx}{2}\right]\right)\right)\Big/$$
$$\left(105\,d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])\right)+$$
$$\left.\frac{32A\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^8\text{Cos}[c+dx]\,\text{Sec}[c]\,\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\,\text{Sin}[dx]}{d\,(1+\text{Cos}[c+dx])^4\,(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2c+2dx])}\right)$$

## Problem 377: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 100 leaves, 4 steps):

$$\frac{2\sqrt{a}\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a\,(3\,B+C)\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,C\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 1495 leaves):

$$-\left(\left(\left(\left(\frac{1}{4}-\frac{i}{4}\right)A\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)\times\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$
$$\frac{i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{\sqrt{2}\,d}-$$
$$\frac{i\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{\sqrt{2}\,d}-$$
$$\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\sqrt{2}\,d}-$$
$$\frac{A\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{2\sqrt{2}\,d}+$$
$$\frac{(2\,B+C)\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{d}-$$
$$\frac{2\,i\,A\,\mathrm{ArcTan}\left[\frac{2\,i\,\mathrm{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Cot}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{d\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\frac{1}{d\left(4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2\right)}$$

$$\sqrt{2}\ A\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\ \mathrm{Csc}\left[\frac{c}{2}\right]\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]$$

$$\left(-d\,x\,\mathrm{Cos}\left[\frac{c}{2}\right]+2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{c}{2}\right]+2\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right]\,\mathrm{Sin}\left[\frac{c}{2}\right]+\frac{4\,\mathrm{i}\,\sqrt{2}\,\mathrm{ArcTan}\left[\frac{2\,\mathrm{i}\,\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\mathrm{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\mathrm{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right)+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{3\,d\,x}{2}\right]\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{3\,c}{2}\right]}{3\,d}+$$

$$\frac{(2\,B+C)\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\ \mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{3\,d}$$

- **Problem 378: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\ \left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 98 leaves, 4 steps):

$$\frac{\sqrt{a}\ (A+2\,B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\ \mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}-\frac{a\,(A-2\,C)\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 527 leaves):

$$\frac{1}{d}\left(\frac{1}{32}+\frac{i}{32}\right)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\;\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{2\,i\,\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(A+2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]}{i+\sqrt{2}}-\right.$$

$$\frac{2\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(A+2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]}{i+\sqrt{2}}+$$

$$\frac{(4+4\,i)\left(-2\,i+\sqrt{2}\right)(A+2\,B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{i+\sqrt{2}}+$$

$$\frac{i\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(A+2\,B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{i+\sqrt{2}}+$$

$$\frac{\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(A+2\,B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{i+\sqrt{2}}+$$

$$\left.\frac{(8-8\,i)\,A}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}+(32-32\,i)\,C\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]-\frac{(8-8\,i)\,A}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}\right)$$

- **Problem 379: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 117 leaves, 4 steps):

$$\frac{\sqrt{a}\,(3\,A+4\,B+8\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a\,(A+4\,B)\,\text{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 627 leaves):

$$\frac{1}{d}\left(\frac{1}{128}+\frac{i}{128}\right)\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\ \mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\left(\frac{2\,i\,\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(3\,A+4\,B+8\,C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]}{i+\sqrt{2}}-\right.$$

$$\frac{2\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(3\,A+4\,B+8\,C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(1+\sqrt{2}\right)\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]}{i+\sqrt{2}}+$$

$$\frac{(4+4\,i)\left(-2\,i+\sqrt{2}\right)(3\,A+4\,B+8\,C)\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{i+\sqrt{2}}+\frac{1}{i+\sqrt{2}}$$

$$i\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(3\,A+4\,B+8\,C)\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{1}{i+\sqrt{2}}$$

$$\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(3\,A+4\,B+8\,C)\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{(8-8\,i)\,(3\,A+4\,B)}{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+$$

$$\left.\frac{(16-16\,i)\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{(16-16\,i)\,A\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{(8-8\,i)\,(3\,A+4\,B)}{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 380: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 163 leaves, 5 steps) :

$$\frac{\sqrt{a}\,(5\,A+6\,B+8\,C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a\,(5\,A+6\,B+8\,C)\,\mathrm{Tan}[c+d\,x]}{8\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a\,(A+6\,B)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{12\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 1178 leaves) :

$$-\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{64}+\frac{i}{64}\right)\left((-1+i)+\sqrt{2}\right)\left((15+5i)A+5\sqrt{2}A+(18+6i)B+6\sqrt{2}B+(24+8i)C+8\sqrt{2}C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{-\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{64}-\frac{i}{64}\right)\left((1+i)+\sqrt{2}\right)\left((-15+5i)A+5\sqrt{2}A-(18-6i)B+6\sqrt{2}B-(24-8i)C+8\sqrt{2}C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\text{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]+\frac{1}{32\left(i+\sqrt{2}\right)d}$$

$$\left(10A+5i\sqrt{2}A+12B+6i\sqrt{2}B+16C+8i\sqrt{2}C\right)\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{128}-\frac{i}{128}\right)\left((-1+i)+\sqrt{2}\right)\left((15+5i)A+5\sqrt{2}A+(18+6i)B+6\sqrt{2}B+(24+8i)C+8\sqrt{2}C\right)$$

$$\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{128}+\frac{i}{128}\right)\left((1+i)+\sqrt{2}\right)\left((-15+5i)A+5\sqrt{2}A-(18-6i)B+6\sqrt{2}B-(24-8i)C+8\sqrt{2}C\right)\sqrt{a(1+\text{Cos}[c+dx])}$$

$$\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]+\frac{A\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{12d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$

$$\frac{(5A+6B+8C)\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}-\frac{A\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{12d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$

$$\frac{(-5A-6B-8C)\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]}{16d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+\frac{\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+2B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{8d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+$$

$$\frac{\sqrt{a(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+2B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{8d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}$$

- **Problem 381: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+dx]}\,\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^5\,dx$$

Optimal (type 3, 209 leaves, 6 steps):

$$\frac{\sqrt{a}\,(35A+40B+48C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{64 d}+\frac{a\,(35A+40B+48C)\,\text{Tan}[c+d x]}{64 d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$

$$\frac{a\,(35A+40B+48C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{96 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a\,(A+8B)\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{24 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{A\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]}{4 d}$$

Result (type 3, 1356 leaves) :

$$-\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{512}+\frac{i}{512}\right)\left((-1+i)+\sqrt{2}\right)\left((105+35\,i)\,A+35\sqrt{2}\,A+(120+40\,i)\,B+40\sqrt{2}\,B+(144+48\,i)\,C+48\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{-\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{512}-\frac{i}{512}\right)\left((1+i)+\sqrt{2}\right)\left((-105+35\,i)\,A+35\sqrt{2}\,A-(120-40\,i)\,B+40\sqrt{2}\,B-(144-48\,i)\,C+48\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\frac{1}{256\left(i+\sqrt{2}\right)d}$$

$$\left(70\,A+35\,i\sqrt{2}\,A+80\,B+40\,i\sqrt{2}\,B+96\,C+48\,i\sqrt{2}\,C\right)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{1024}-\frac{i}{1024}\right)\left((-1+i)+\sqrt{2}\right)\left((105+35\,i)\,A+35\sqrt{2}\,A+(120+40\,i)\,B+40\sqrt{2}\,B+(144+48\,i)\,C+48\sqrt{2}\,C\right)$$

$$\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{1024}+\frac{i}{1024}\right)\left((1+i)+\sqrt{2}\right)\left((-105+35\,i)\,A+35\sqrt{2}\,A-(120-40\,i)\,B+40\sqrt{2}\,B-(144-48\,i)\,C+48\sqrt{2}\,C\right)$$

$$\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+$$

$$\frac{(7\,A+8\,B)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{96\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{(35\,A+40\,B+48\,C)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{128\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\frac{A\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{A\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+$$

$$\frac{(-7\,A-8\,B)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{96\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{(-35\,A-40\,B-48\,C)\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{128\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(11\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+8\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+16\,C\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}{64\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$

$$\frac{\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(11\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+8\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+16\,C\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}{64\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}$$

## ■ Problem 385: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a + a \cos[c + d x])^{3/2} \left(A + B \cos[c + d x] + C \cos[c + d x]^2\right) \sec[c + d x] \, dx$$

Optimal (type 3, 142 leaves, 5 steps):

$$\frac{2 a^{3/2} A \operatorname{ArcTanh}\left[\frac{\sqrt{a} \sin[c+d x]}{\sqrt{a+a \cos[c+d x]}}\right]}{d} + \frac{2 a^2 (15 A + 20 B + 12 C) \sin[c + d x]}{15 d \sqrt{a + a \cos[c + d x]}} + \frac{2 a (5 B + 3 C) \sqrt{a + a \cos[c + d x]} \sin[c + d x]}{15 d} + \frac{2 C (a + a \cos[c + d x])^{3/2} \sin[c + d x]}{5 d}$$

Result (type 3, 1649 leaves):

$$-\Bigg(\bigg(\Big(\Big(\frac{1}{8} - \frac{i}{8}\Big) A \left(1 + e^{i c}\right) \Big(\sqrt{2} - (1 - i) e^{\frac{i c}{2}} + (16 - 16 i) e^{\frac{3 i c}{2} + i d x} + (20 + 20 i) \sqrt{2} e^{2 i c + \frac{3 i d x}{2}} - (34 - 34 i) e^{\frac{5 i c}{2} + 2 i d x} - (20 + 20 i) \sqrt{2} e^{3 i c + \frac{5 i d x}{2}} +$$

$$(16 - 16 i) e^{\frac{7 i c}{2} + 3 i d x} + (4 + 4 i) \sqrt{2} e^{4 i c + \frac{7 i d x}{2}} - (1 - i) e^{\frac{9 i c}{2} + 4 i d x} + 8 i e^{\frac{1}{2} i (c+d x)} - 16 \sqrt{2} e^{i (c+d x)} - 40 i e^{\frac{3}{2} i (c+d x)} + 34 \sqrt{2} e^{2 i (c+d x)} +$$

$$40 i e^{\frac{5}{2} i (c+d x)} - 16 \sqrt{2} e^{3 i (c+d x)} - 8 i e^{\frac{7}{2} i (c+d x)} + \sqrt{2} e^{4 i (c+d x)} - (4 + 4 i) \sqrt{2} e^{\frac{1}{2} i (2 c+d x)}\Big) \times (a (1 + \cos[c + d x]))^{3/2} \sec\Big[\frac{c}{2} + \frac{d x}{2}\Big]^3\Big) \Big/$$

$$\bigg(\Big((-1 - i) + \sqrt{2} e^{\frac{i c}{2}}\Big) \left(-1 + e^{i c}\right) \Big(i - 2 \sqrt{2} e^{\frac{1}{2} i (c+d x)} - 4 i e^{i (c+d x)} + 2 \sqrt{2} e^{\frac{3}{2} i (c+d x)} + i e^{2 i (c+d x)}\Big)^2\bigg)\Bigg) -$$

$$\frac{i A \operatorname{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \sin\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{2 \sqrt{2} d} -$$

$$\frac{i A \operatorname{ArcTan}\left[\frac{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sin\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2} \sin\left[\frac{c}{4}+\frac{d x}{4}\right]}{\cos\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2} \cos\left[\frac{c}{4}+\frac{d x}{4}\right]-\sin\left[\frac{c}{4}+\frac{d x}{4}\right]}\right] (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{2 \sqrt{2} d} -$$

$$\frac{A (a (1 + \cos[c + d x]))^{3/2} \operatorname{Log}\left[2 - \sqrt{2} \cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sqrt{2} \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{4 \sqrt{2} d} -$$

$$\frac{A (a (1 + \cos[c + d x]))^{3/2} \operatorname{Log}\left[2 + \sqrt{2} \cos\left[\frac{c}{2} + \frac{d x}{2}\right] - \sqrt{2} \sin\left[\frac{c}{2} + \frac{d x}{2}\right]\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3}{4 \sqrt{2} d} +$$

$$\frac{(2 A + 3 B + 2 C) \cos\left[\frac{d x}{2}\right] (a (1 + \cos[c + d x]))^{3/2} \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \sin\left[\frac{c}{2}\right]}{2 d} -$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Cot}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(A\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]\right]\,\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\,\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(2\,B+3\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{3\,c}{2}\right]}{12\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{5\,c}{2}\right]}{20\,d}+$$

$$\frac{(2\,A+3\,B+2\,C)\,\text{Cos}\left[\frac{c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+$$

$$\frac{(2\,B+3\,C)\,\text{Cos}\left[\frac{3\,c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{12\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{5\,c}{2}\right]\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{20\,d}$$

- **Problem 386: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 144 leaves, 5 steps) :

$$\frac{a^{3/2}\,(3A+2B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}-\frac{a^2\,(3A-6B-8C)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$
$$\frac{a\,(3A-2C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Tan}[c+d\,x]}{d}$$

Result (type 3, 561 leaves):

$$\frac{1}{d}\left(\frac{1}{192}+\frac{i}{192}\right)(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3$$
$$\left(\frac{6\,i\,\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(3A+2B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]}{i+\sqrt{2}}-\right.$$
$$\frac{6\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(3A+2B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]}{i+\sqrt{2}}+$$
$$\frac{(12+12\,i)\left(-2\,i+\sqrt{2}\right)(3A+2B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{i+\sqrt{2}}+\frac{1}{i+\sqrt{2}}$$
$$3\,i\,\sqrt{2}\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(3A+2B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{1}{i+\sqrt{2}}$$
$$3\,\sqrt{2}\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(3A+2B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{(24-24\,i)\,A}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}+$$
$$\left.(48-48\,i)\,(2B+3C)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]-\frac{(24-24\,i)\,A}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}+(16-16\,i)\,C\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)$$

- **Problem 387: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 159 leaves, 5 steps):

$$\frac{a^{3/2}\,(7 A+12 B+8 C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{4 d}-\frac{a^2\,(5 A+4 B-8 C)\,\text{Sin}[c+d x]}{4 d\,\sqrt{a+a\,\text{Cos}[c+d x]}}+$$
$$\frac{a\,(3 A+4 B)\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Tan}[c+d x]}{4 d}+\frac{A\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{2 d}$$

Result (type 3, 644 leaves):

$$\frac{1}{d}\left(\frac{1}{256}+\frac{i}{256}\right)(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3$$
$$\left(\frac{2 i \sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(7 A+12 B+8 C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d x)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]}\right]}{i+\sqrt{2}}-\right.$$
$$\frac{2 \sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(7 A+12 B+8 C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+d x)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]}\right]}{i+\sqrt{2}}+$$
$$\frac{(4+4 i)\left(-2 i+\sqrt{2}\right)(7 A+12 B+8 C)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{i+\sqrt{2}}+\frac{1}{i+\sqrt{2}}$$
$$i \sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(7 A+12 B+8 C)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]+$$
$$\frac{1}{i+\sqrt{2}}\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(7 A+12 B+8 C)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]+$$
$$\frac{(8-8 i)(7 A+4 B)}{\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]}+(128-128 i)\,C\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+\frac{(16-16 i)\,A\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$
$$\left.\frac{(16-16 i)\,A\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{(8-8 i)(7 A+4 B)}{\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]}\right)$$

- **Problem 388: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d x])^{3/2}\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^4\,dx$$

Optimal (type 3, 165 leaves, 5 steps):

$$\frac{a^{3/2}\,(11\,A+14\,B+24\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a^2\,(19\,A+30\,B+24\,C)\,\text{Tan}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a\,(A+2\,B)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 1202 leaves) :

$$-\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{128}+\frac{i}{128}\right)\left((-1+i)+\sqrt{2}\right)\left((33+11i)A+11\sqrt{2}A+(42+14i)B+14\sqrt{2}B+(72+24i)C+24\sqrt{2}C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{-\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right](a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{128}-\frac{i}{128}\right)\left((1+i)+\sqrt{2}\right)\left((-33+11i)A+11\sqrt{2}A-(42-14i)B+14\sqrt{2}B-(72-24i)C+24\sqrt{2}C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\text{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right](a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3+\frac{1}{64\left(i+\sqrt{2}\right)d}$$

$$\left(22A+11i\sqrt{2}A+28B+14i\sqrt{2}B+48C+24i\sqrt{2}C\right)(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{256}-\frac{i}{256}\right)\left((-1+i)+\sqrt{2}\right)\left((33+11i)A+11\sqrt{2}A+(42+14i)B+14\sqrt{2}B+(72+24i)C+24\sqrt{2}C\right)$$

$$(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{256}+\frac{i}{256}\right)\left((1+i)+\sqrt{2}\right)\left((-33+11i)A+11\sqrt{2}A-(42-14i)B+14\sqrt{2}B-(72-24i)C+24\sqrt{2}C\right)(a(1+\text{Cos}[c+dx]))^{3/2}$$

$$\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3+\frac{A\,(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{24d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$

$$\frac{(11A+14B+8C)(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}-\frac{A\,(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{24d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+$$

$$\frac{(-11A-14B-8C)(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{32d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+\frac{(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(3A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+2B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{16d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+$$

$$\frac{(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(3A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+2B\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}{16d\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}$$

- **Problem 389: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+dx])^{3/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^5\,dx$$

Optimal (type 3, 215 leaves, 6 steps):

$$\frac{a^{3/2}\,(75A+88B+112C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{64\,d}+\frac{a^2\,(75A+88B+112C)\,\mathrm{Tan}[c+dx]}{64\,d\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+\frac{a^2\,(39A+56B+48C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{96\,d\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}+$$

$$\frac{a\,(3A+8B)\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}\,\mathrm{Sec}[c+dx]^2\,\mathrm{Tan}[c+dx]}{24\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}\,\mathrm{Sec}[c+dx]^3\,\mathrm{Tan}[c+dx]}{4\,d}$$

Result (type 3, 1382 leaves):

$$-\frac{1}{\sqrt{2}\,\left(i+\sqrt{2}\right)d}\left(\frac{1}{1024}+\frac{i}{1024}\right)\left((-1+i)+\sqrt{2}\right)\left((225+75\,i)\,A+75\sqrt{2}\,A+(264+88\,i)\,B+88\sqrt{2}\,B+(336+112\,i)\,C+112\sqrt{2}\,C\right)$$

$$\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]}{-\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3-$$

$$\frac{1}{\sqrt{2}\,\left(i+\sqrt{2}\right)d}\left(\frac{1}{1024}-\frac{i}{1024}\right)\left((1+i)+\sqrt{2}\right)\left((-225+75\,i)\,A+75\sqrt{2}\,A-(264-88\,i)\,B+88\sqrt{2}\,B-(336-112\,i)\,C+112\sqrt{2}\,C\right)$$

$$\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]}{\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3+\frac{1}{512\,\left(i+\sqrt{2}\right)d}$$

$$\left(150A+75\,i\sqrt{2}\,A+176B+88\,i\sqrt{2}\,B+224C+112\,i\sqrt{2}\,C\right)\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3-$$

$$\frac{1}{\sqrt{2}\,\left(i+\sqrt{2}\right)d}\left(\frac{1}{2048}-\frac{i}{2048}\right)\left((-1+i)+\sqrt{2}\right)\left((225+75\,i)\,A+75\sqrt{2}\,A+(264+88\,i)\,B+88\sqrt{2}\,B+(336+112\,i)\,C+112\sqrt{2}\,C\right)$$

$$(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3+\frac{1}{\sqrt{2}\,\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{2048}+\frac{i}{2048}\right)\left((1+i)+\sqrt{2}\right)\left((-225+75\,i)\,A+75\sqrt{2}\,A-(264-88\,i)\,B+88\sqrt{2}\,B-(336-112\,i)\,C+112\sqrt{2}\,C\right)$$

$$(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3+$$

$$\frac{(15A+8B)\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{192\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^3}+\frac{(75A+88B+112C)\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3}{256\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)}+$$

$$\frac{A\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]}{32\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^4}+\frac{A\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\,\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]}{32\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^4}+$$

$$\frac{(-15 A-8 B)\ (a\ (1+\text{Cos}[c+d x]))^{3/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{192\ d\ \left(\text{Cos}\left[\frac{1}{2}\ (c+d x)\right]+\text{Sin}\left[\frac{1}{2}\ (c+d x)\right]\right)^3}+\frac{(-75 A-88 B-112 C)\ (a\ (1+\text{Cos}[c+d x]))^{3/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{256\ d\ \left(\text{Cos}\left[\frac{1}{2}\ (c+d x)\right]+\text{Sin}\left[\frac{1}{2}\ (c+d x)\right]\right)}+$$

$$\left((a\ (1+\text{Cos}[c+d x]))^{3/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(19 A\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]+24 B\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]+16 C\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]\right)\right)\Big/$$
$$\left(128\ d\ \left(\text{Cos}\left[\frac{1}{2}\ (c+d x)\right]-\text{Sin}\left[\frac{1}{2}\ (c+d x)\right]\right)^2\right)+$$
$$\left((a\ (1+\text{Cos}[c+d x]))^{3/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(19 A\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]+24 B\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]+16 C\ \text{Sin}\left[\frac{1}{2}\ (c+d x)\right]\right)\right)\Big/$$
$$\left(128\ d\ \left(\text{Cos}\left[\frac{1}{2}\ (c+d x)\right]+\text{Sin}\left[\frac{1}{2}\ (c+d x)\right]\right)^2\right)$$

- **Problem 390: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\ \text{Cos}[c+d x])^{3/2}\ \left(A+B\ \text{Cos}[c+d x]+C\ \text{Cos}[c+d x]^2\right)\ \text{Sec}[c+d x]^6\, dx$$

Optimal (type 3, 263 leaves, 7 steps):

$$\frac{a^{3/2}\ (133 A+150 B+176 C)\ \text{ArcTanh}\left[\frac{\sqrt{a}\ \text{Sin}[c+d x]}{\sqrt{a+a\ \text{Cos}[c+d x]}}\right]}{128\ d}+\frac{a^2\ (133 A+150 B+176 C)\ \text{Tan}[c+d x]}{128\ d\ \sqrt{a+a\ \text{Cos}[c+d x]}}+$$
$$\frac{a^2\ (133 A+150 B+176 C)\ \text{Sec}[c+d x]\ \text{Tan}[c+d x]}{192\ d\ \sqrt{a+a\ \text{Cos}[c+d x]}}+\frac{a^2\ (67 A+90 B+80 C)\ \text{Sec}[c+d x]^2\ \text{Tan}[c+d x]}{240\ d\ \sqrt{a+a\ \text{Cos}[c+d x]}}+$$
$$\frac{a\ (3 A+10 B)\ \sqrt{a+a\ \text{Cos}[c+d x]}\ \ \text{Sec}[c+d x]^3\ \text{Tan}[c+d x]}{40\ d}+\frac{A\ (a+a\ \text{Cos}[c+d x])^{3/2}\ \text{Sec}[c+d x]^4\ \text{Tan}[c+d x]}{5\ d}$$

Result (type 3, 1542 leaves):

$$-\frac{1}{\sqrt{2}\ \left(i+\sqrt{2}\right)\ d}\left(\frac{1}{2048}+\frac{i}{2048}\right)\ \left((-1+i)+\sqrt{2}\right)\ \left((399+133\, i)\ A+133\sqrt{2}\ A+(450+150\, i)\ B+150\sqrt{2}\ B+(528+176\, i)\ C+176\sqrt{2}\ C\right)$$
$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\ (c+d x)\right]-\text{Sin}\left[\frac{1}{4}\ (c+d x)\right]-\sqrt{2}\ \text{Sin}\left[\frac{1}{4}\ (c+d x)\right]}{-\text{Cos}\left[\frac{1}{4}\ (c+d x)\right]+\sqrt{2}\ \text{Cos}\left[\frac{1}{4}\ (c+d x)\right]-\text{Sin}\left[\frac{1}{4}\ (c+d x)\right]}\right]\ (a\ (1+\text{Cos}[c+d x]))^{3/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3-\frac{1}{\sqrt{2}\ \left(i+\sqrt{2}\right)\ d}$$
$$\left(\frac{1}{2048}-\frac{i}{2048}\right)\ \left((1+i)+\sqrt{2}\right)\ \left((-399+133\, i)\ A+133\sqrt{2}\ A-(450-150\, i)\ B+150\sqrt{2}\ B-(528-176\, i)\ C+176\sqrt{2}\ C\right)$$
$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\ (c+d x)\right]+\text{Sin}\left[\frac{1}{4}\ (c+d x)\right]-\sqrt{2}\ \text{Sin}\left[\frac{1}{4}\ (c+d x)\right]}{\text{Cos}\left[\frac{1}{4}\ (c+d x)\right]+\sqrt{2}\ \text{Cos}\left[\frac{1}{4}\ (c+d x)\right]-\text{Sin}\left[\frac{1}{4}\ (c+d x)\right]}\right]\ (a\ (1+\text{Cos}[c+d x]))^{3/2}\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3+\frac{1}{1024\ \left(i+\sqrt{2}\right)\ d}$$

$$\left(266\,A+133\,i\sqrt{2}\,A+300\,B+150\,i\sqrt{2}\,B+352\,C+176\,i\sqrt{2}\,C\right)\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{4096}-\frac{i}{4096}\right)\left((-1+i)+\sqrt{2}\right)\left((399+133\,i)\,A+133\sqrt{2}\,A+(450+150\,i)\,B+150\sqrt{2}\,B+(528+176\,i)\,C+176\sqrt{2}\,C\right)$$

$$\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{4096}+\frac{i}{4096}\right)\left((1+i)+\sqrt{2}\right)\left((-399+133\,i)\,A+133\sqrt{2}\,A-(450-150\,i)\,B+150\sqrt{2}\,B-(528-176\,i)\,C+176\sqrt{2}\,C\right)$$

$$\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3+$$

$$\frac{A\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{80\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+\frac{(29\,A+30\,B+16\,C)\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{384\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(133\,A+150\,B+176\,C)\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{512\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}-\frac{A\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{80\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^5}+$$

$$\frac{(-29\,A-30\,B-16\,C)\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{384\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{(-133\,A-150\,B-176\,C)\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{512\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\frac{\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{64\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$

$$\frac{\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{64\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$

$$\left(\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(37\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+38\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+48\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/$$

$$\left(256\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2\right)+$$

$$\left(\left(a\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(37\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+38\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+48\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/$$

$$\left(256\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2\right)$$

- **Problem 394: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]\,dx$$

Optimal (type 3, 182 leaves, 6 steps):

$$\frac{2\,a^{5/2}\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^3\,(245\,A+224\,B+160\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,a^2\,(35\,A+56\,B+40\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d}+$$
$$\frac{2\,a\,(7\,B+5\,C)\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{35\,d}+\frac{2\,C\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 3, 1772 leaves):

$$-\left(\left(\left(\left(\frac{1}{16}-\frac{i}{16}\right)A\left(1+e^{i\,c}\right)\left(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+\right.\right.\right.\right.$$
$$(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+$$
$$\left.\left.40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\right)x\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right)\Big/$$
$$\left.\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\left(i-2\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}-4\,i\,e^{i\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,i\,(c+d\,x)}+i\,e^{2\,i\,(c+d\,x)}\right)^2\right)\right)-$$
$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$
$$\frac{i\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{4\,\sqrt{2}\,d}-$$
$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}-$$
$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,\sqrt{2}\,d}+$$
$$\frac{5\,(4\,A+4\,B+3\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{c}{2}\right]}{16\,d}-$$

$$\frac{i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Cot}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{2\,d\,\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}+$$

$$\left(A\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right.$$

$$\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\,\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\Bigg)\Bigg/$$

$$\left(2\,\sqrt{2}\,d\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+\frac{(4\,A+10\,B+11\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{3\,c}{2}\right]}{48\,d}+$$

$$\frac{(2\,B+5\,C)\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{5\,c}{2}\right]}{80\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{7\,c}{2}\right]}{112\,d}+$$

$$\frac{5\,(4\,A+4\,B+3\,C)\,\text{Cos}\left[\frac{c}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{d\,x}{2}\right]}{16\,d}+$$

$$\frac{(4\,A+10\,B+11\,C)\,\text{Cos}\left[\frac{3\,c}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{48\,d}+$$

$$\frac{(2\,B+5\,C)\,\text{Cos}\left[\frac{5\,c}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{80\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{7\,c}{2}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sin}\left[\frac{7\,d\,x}{2}\right]}{112\,d}$$

- **Problem 395: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 184 leaves, 6 steps):

$$\frac{a^{5/2}\,(5\,A+2\,B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{a^3\,(15\,A+70\,B+64\,C)\,\mathrm{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}-\frac{a^2\,(15\,A-10\,B-16\,C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d}-\frac{a\,(5\,A-2\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 3, 584 leaves):

$$\frac{1}{d}\left(\frac{1}{1920}+\frac{i}{1920}\right)(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5$$
$$\left(\frac{30\,i\,\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(5\,A+2\,B)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]}{i+\sqrt{2}}-\right.$$
$$\frac{30\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(5\,A+2\,B)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\left(1+\sqrt{2}\right)\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]}{i+\sqrt{2}}+$$
$$\frac{(60+60\,i)\left(-2\,i+\sqrt{2}\right)(5\,A+2\,B)\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{i+\sqrt{2}}+\frac{1}{i+\sqrt{2}}$$
$$15\,i\,\sqrt{2}\,\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(5\,A+2\,B)\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$\frac{1}{i+\sqrt{2}}15\,\sqrt{2}\,\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(5\,A+2\,B)\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+$$
$$\frac{(120-120\,i)\,A}{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+(240-240\,i)\,(2\,A+5\,(B+C))\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-$$
$$\left.\frac{(120-120\,i)\,A}{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+(40-40\,i)\,(2\,B+5\,C)\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+(24-24\,i)\,C\,\mathrm{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)$$

- **Problem 396: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 199 leaves, 6 steps):

$$\frac{a^{5/2}(19A+20B+8C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{4d}-\frac{a^3(27A-12B-56C)\,\text{Sin}[c+dx]}{12d\sqrt{a+a\,\text{Cos}[c+dx]}}-\frac{a^2(21A+12B-8C)\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{12d}+\frac{a(5A+4B)(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Tan}[c+dx]}{4d}+\frac{A(a+a\,\text{Cos}[c+dx])^{5/2}\,\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{2d}$$

Result (type 3, 666 leaves):

$$\frac{1}{d}\left(\frac{1}{1536}+\frac{i}{1536}\right)(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^5$$
$$\left(\frac{6i\sqrt{2}\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(19A+20B+8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]}{i+\sqrt{2}}-\right.$$
$$\frac{6\sqrt{2}\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(19A+20B+8C)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]}{i+\sqrt{2}}+$$
$$\frac{(12+12i)\left(-2i+\sqrt{2}\right)(19A+20B+8C)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]}{i+\sqrt{2}}+\frac{1}{i+\sqrt{2}}$$
$$3i\sqrt{2}\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(19A+20B+8C)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]+$$
$$\frac{1}{i+\sqrt{2}}3\sqrt{2}\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(19A+20B+8C)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]+$$
$$\frac{(24-24i)(11A+4B)}{\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]}+(192-192i)(2B+5C)\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+\frac{(48-48i)\,A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}+$$
$$\left.\frac{(48-48i)\,A\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right)^2}-\frac{(24-24i)(11A+4B)}{\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]}+(64-64i)\,C\,\text{Sin}\left[\frac{3}{2}(c+dx)\right]\right)$$

- **Problem 397: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+dx])^{5/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^4\,dx$$

Optimal (type 3, 207 leaves, 6 steps):

$$\frac{a^{5/2}\,(25\,A+38\,B+40\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}-\frac{a^3\,(49\,A+54\,B-24\,C)\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^2\,(31\,A+42\,B+24\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Tan}[c+d\,x]}{24\,d}+$$
$$\frac{a\,(5\,A+6\,B)\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 1249 leaves) :

$$-\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{256}+\frac{i}{256}\right)\left((-1+i)+\sqrt{2}\right)\left((75+25\,i)\,A+25\sqrt{2}\,A+(114+38\,i)\,B+38\sqrt{2}\,B+(120+40\,i)\,C+40\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{-\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{256}-\frac{i}{256}\right)\left((1+i)+\sqrt{2}\right)\left((-75+25\,i)\,A+25\sqrt{2}\,A-(114-38\,i)\,B+38\sqrt{2}\,B-(120-40\,i)\,C+40\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{128\left(i+\sqrt{2}\right)d}$$

$$\left(50\,A+25\,i\sqrt{2}\,A+76\,B+38\,i\sqrt{2}\,B+80\,C+40\,i\sqrt{2}\,C\right)(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{512}-\frac{i}{512}\right)\left((-1+i)+\sqrt{2}\right)\left((75+25\,i)\,A+25\sqrt{2}\,A+(114+38\,i)\,B+38\sqrt{2}\,B+(120+40\,i)\,C+40\sqrt{2}\,C\right)$$

$$(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{512}+\frac{i}{512}\right)\left((1+i)+\sqrt{2}\right)\left((-75+25\,i)\,A+25\sqrt{2}\,A-(114-38\,i)\,B+38\sqrt{2}\,B-(120-40\,i)\,C+40\sqrt{2}\,C\right)(a\,(1+\text{Cos}[c+d\,x]))^{5/2}$$

$$\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{48\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+$$

$$\frac{(25\,A+22\,B+8\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{64\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+\frac{C\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{2\,d}-$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{48\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{(-25\,A-22\,B-8\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{64\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(5\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}{32\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(5\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}{32\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}$$

## Problem 398: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int (a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 215 leaves, 6 steps):

$$\frac{a^{5/2}\,(163\,A+200\,B+304\,C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{a^3\,(299\,A+392\,B+432\,C)\,\mathrm{Tan}[c+d\,x]}{192\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,(17\,A+24\,B+16\,C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{32\,d}+\frac{a\,(5\,A+8\,B)\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{24\,d}+\frac{A\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 1382 leaves):

$$-\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{2048}+\frac{i}{2048}\right)\left((-1+i)+\sqrt{2}\right)\left((489+163\,i)\,A+163\sqrt{2}\,A+(600+200\,i)\,B+200\sqrt{2}\,B+(912+304\,i)\,C+304\sqrt{2}\,C\right)$$
$$\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{-\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right](a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$
$$\left(\frac{1}{2048}-\frac{i}{2048}\right)\left((1+i)+\sqrt{2}\right)\left((-489+163\,i)\,A+163\sqrt{2}\,A-(600-200\,i)\,B+200\sqrt{2}\,B-(912-304\,i)\,C+304\sqrt{2}\,C\right)$$
$$\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right](a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{1024\left(i+\sqrt{2}\right)d}$$
$$\left(326\,A+163\,i\sqrt{2}\,A+400\,B+200\,i\sqrt{2}\,B+608\,C+304\,i\sqrt{2}\,C\right)(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-$$
$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{4096}-\frac{i}{4096}\right)\left((-1+i)+\sqrt{2}\right)\left((489+163\,i)\,A+163\sqrt{2}\,A+(600+200\,i)\,B+200\sqrt{2}\,B+(912+304\,i)\,C+304\sqrt{2}\,C\right)$$
$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$
$$\left(\frac{1}{4096}+\frac{i}{4096}\right)\left((1+i)+\sqrt{2}\right)\left((-489+163\,i)\,A+163\sqrt{2}\,A-(600-200\,i)\,B+200\sqrt{2}\,B-(912-304\,i)\,C+304\sqrt{2}\,C\right)$$
$$(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+$$

$$\frac{(23 A+8 B) (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{384 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{(163 A+200 B+176 C) (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{512 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$

$$\frac{A (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{64 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{A (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{64 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+$$

$$\frac{(-23 A-8 B) (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{384 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{(-163 A-200 B-176 C) (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5}{512 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$

$$\left((a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(43 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+40 B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+16 C \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)\Big/$$
$$\left(256 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2\right)+$$
$$\left((a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(43 A \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+40 B \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]+16 C \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)\Big/$$
$$\left(256 d \left(\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2\right)$$

- **Problem 399: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a \operatorname{Cos}[c+d x])^{5/2} \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^6 \, dx$$

Optimal (type 3, 261 leaves, 7 steps):

$$\frac{a^{5/2} (283 A+326 B+400 C) \operatorname{ArcTanh}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{128 d}+\frac{a^3 (283 A+326 B+400 C) \operatorname{Tan}[c+d x]}{128 d \sqrt{a+a \operatorname{Cos}[c+d x]}}+$$

$$\frac{a^3 (787 A+950 B+1040 C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{960 d \sqrt{a+a \operatorname{Cos}[c+d x]}}+\frac{a^2 (79 A+110 B+80 C) \sqrt{a+a \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{240 d}+$$

$$\frac{a (A+2 B) (a+a \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{8 d}+\frac{A (a+a \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sec}[c+d x]^4 \operatorname{Tan}[c+d x]}{5 d}$$

Result (type 3, 1542 leaves):

$$-\frac{1}{\sqrt{2} \left(i+\sqrt{2}\right) d}\left(\frac{1}{4096}+\frac{i}{4096}\right) \left((-1+i)+\sqrt{2}\right) \left((849+283 i) A+283 \sqrt{2} A+(978+326 i) B+326 \sqrt{2} B+(1200+400 i) C+400 \sqrt{2} C\right)$$

$$\operatorname{ArcTan}\left[\frac{\operatorname{Cos}\left[\frac{1}{4} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{4} (c+d x)\right]-\sqrt{2} \operatorname{Sin}\left[\frac{1}{4} (c+d x)\right]}{-\operatorname{Cos}\left[\frac{1}{4} (c+d x)\right]+\sqrt{2} \operatorname{Cos}\left[\frac{1}{4} (c+d x)\right]-\operatorname{Sin}\left[\frac{1}{4} (c+d x)\right]}\right] (a (1+\operatorname{Cos}[c+d x]))^{5/2} \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5-\frac{1}{\sqrt{2} \left(i+\sqrt{2}\right) d}$$

$$\left(\frac{1}{4096}-\frac{i}{4096}\right)\left((1+i)+\sqrt{2}\right)\left((-849+283\,i)\,A+283\sqrt{2}\,A-(978-326\,i)\,B+326\sqrt{2}\,B-(1200-400\,i)\,C+400\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right](a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{2048\left(i+\sqrt{2}\right)d}$$

$$\left(566\,A+283\,i\sqrt{2}\,A+652\,B+326\,i\sqrt{2}\,B+800\,C+400\,i\sqrt{2}\,C\right)(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-$$

$$\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}\left(\frac{1}{8192}-\frac{i}{8192}\right)\left((-1+i)+\sqrt{2}\right)\left((849+283\,i)\,A+283\sqrt{2}\,A+(978+326\,i)\,B+326\sqrt{2}\,B+(1200+400\,i)\,C+400\sqrt{2}\,C\right)$$

$$(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{\sqrt{2}\left(i+\sqrt{2}\right)d}$$

$$\left(\frac{1}{8192}+\frac{i}{8192}\right)\left((1+i)+\sqrt{2}\right)\left((-849+283\,i)\,A+283\sqrt{2}\,A-(978-326\,i)\,B+326\sqrt{2}\,B-(1200-400\,i)\,C+400\sqrt{2}\,C\right)$$

$$(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+$$

$$\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{160\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^5}+\frac{(59\,A+46\,B+16\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{768\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+$$

$$\frac{(283\,A+326\,B+400\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}-\frac{A\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{160\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^5}+$$

$$\frac{(-59\,A-46\,B-16\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{768\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{(-283\,A-326\,B-400\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{1024\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(5\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}{128\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+$$

$$\frac{(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(5\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}{128\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+$$

$$\left((a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(75\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+86\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+80\,C\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(512\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2\right)+$$

$$\left(\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(75\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+86\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+80\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(512\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2\right)$$

- **Problem 400: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^7\,dx$$

Optimal (type 3, 311 leaves, 8 steps):

$$\frac{a^{5/2}\,(1015\,A+1132\,B+1304\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{512\,d}+\frac{a^3\,(1015\,A+1132\,B+1304\,C)\,\text{Tan}[c+d\,x]}{512\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a^3\,(1015\,A+1132\,B+1304\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{768\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^3\,(545\,A+628\,B+680\,C)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{960\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a^2\,(115\,A+156\,B+120\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{480\,d}+$$
$$\frac{a\,(5\,A+12\,B)\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{60\,d}+\frac{A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^5\,\text{Tan}[c+d\,x]}{6\,d}$$

Result (type 3, 1045 leaves):

$$-\frac{1}{\sqrt{2}\left(\mathrm{i}+\sqrt{2}\right)d}\left(\frac{1}{16384}+\frac{\mathrm{i}}{16384}\right)\left((-1+\mathrm{i})+\sqrt{2}\right)\left((3045+1015\,\mathrm{i})\,A+1015\sqrt{2}\,A+(3396+1132\,\mathrm{i})\,B+1132\sqrt{2}\,B+(3912+1304\,\mathrm{i})\,C+1304\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{-\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-\frac{1}{\sqrt{2}\left(\mathrm{i}+\sqrt{2}\right)d}$$

$$\left(\frac{1}{16384}-\frac{\mathrm{i}}{16384}\right)\left((1+\mathrm{i})+\sqrt{2}\right)\left((-3045+1015\,\mathrm{i})\,A+1015\sqrt{2}\,A-(3396-1132\,\mathrm{i})\,B+1132\sqrt{2}\,B-(3912-1304\,\mathrm{i})\,C+1304\sqrt{2}\,C\right)$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{8192\left(\mathrm{i}+\sqrt{2}\right)d}$$

$$\left(2030\,A+1015\,\mathrm{i}\sqrt{2}\,A+2264\,B+1132\,\mathrm{i}\sqrt{2}\,B+2608\,C+1304\,\mathrm{i}\sqrt{2}\,C\right)\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5-$$

$$\frac{1}{\sqrt{2}\left(\mathrm{i}+\sqrt{2}\right)d}\left(\frac{1}{32768}-\frac{\mathrm{i}}{32768}\right)\left((-1+\mathrm{i})+\sqrt{2}\right)\left((3045+1015\,\mathrm{i})\,A+1015\sqrt{2}\,A+(3396+1132\,\mathrm{i})\,B+1132\sqrt{2}\,B+(3912+1304\,\mathrm{i})\,C+1304\sqrt{2}\,C\right)$$

$$\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+\frac{1}{\sqrt{2}\left(\mathrm{i}+\sqrt{2}\right)d}$$

$$\left(\frac{1}{32768}+\frac{\mathrm{i}}{32768}\right)\left((1+\mathrm{i})+\sqrt{2}\right)\left((-3045+1015\,\mathrm{i})\,A+1015\sqrt{2}\,A-(3396-1132\,\mathrm{i})\,B+1132\sqrt{2}\,B-(3912-1304\,\mathrm{i})\,C+1304\sqrt{2}\,C\right)$$

$$\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5+$$

$$\frac{1}{983040\,d}\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Sec}[c+d\,x]^6\left(-47250\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]-78120\,B\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]-96720\,C\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$184490\,A\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+167944\,B\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+164240\,C\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]+28275\,A\,\text{Sin}\left[\frac{5}{2}(c+d\,x)\right]+13980\,B\,\text{Sin}\left[\frac{5}{2}(c+d\,x)\right]-$$

$$7560\,C\,\text{Sin}\left[\frac{5}{2}(c+d\,x)\right]+88305\,A\,\text{Sin}\left[\frac{7}{2}(c+d\,x)\right]+98484\,B\,\text{Sin}\left[\frac{7}{2}(c+d\,x)\right]+101160\,C\,\text{Sin}\left[\frac{7}{2}(c+d\,x)\right]+5075\,A\,\text{Sin}\left[\frac{9}{2}(c+d\,x)\right]+$$

$$\left.5660\,B\,\text{Sin}\left[\frac{9}{2}(c+d\,x)\right]+6520\,C\,\text{Sin}\left[\frac{9}{2}(c+d\,x)\right]+15225\,A\,\text{Sin}\left[\frac{11}{2}(c+d\,x)\right]+16980\,B\,\text{Sin}\left[\frac{11}{2}(c+d\,x)\right]+19560\,C\,\text{Sin}\left[\frac{11}{2}(c+d\,x)\right]\right)$$

- **Problem 405: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 118 leaves, 6 steps) :

$$\frac{2\,A\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B+C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,C\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 2315 leaves) :

$$-\left(\left((1-\mathrm{i})\,A\,\left(1+e^{\mathrm{i}\,c}\right)\,\left(\sqrt{2}-(1-\mathrm{i})\,e^{\frac{\mathrm{i}\,c}{2}}+(16-16\,\mathrm{i})\,e^{\frac{3\,\mathrm{i}\,c}{2}+\mathrm{i}\,d\,x}+(20+20\,\mathrm{i})\,\sqrt{2}\,e^{2\,\mathrm{i}\,c+\frac{3\,\mathrm{i}\,d\,x}{2}}-(34-34\,\mathrm{i})\,e^{\frac{5\,\mathrm{i}\,c}{2}+2\,\mathrm{i}\,d\,x}-(20+20\,\mathrm{i})\,\sqrt{2}\,e^{3\,\mathrm{i}\,c+\frac{5\,\mathrm{i}\,d\,x}{2}}+\right.\right.\right.$$

$$(16-16\,\mathrm{i})\,e^{\frac{7\,\mathrm{i}\,c}{2}+3\,\mathrm{i}\,d\,x}+(4+4\,\mathrm{i})\,\sqrt{2}\,e^{4\,\mathrm{i}\,c+\frac{7\,\mathrm{i}\,d\,x}{2}}-(1-\mathrm{i})\,e^{\frac{9\,\mathrm{i}\,c}{2}+4\,\mathrm{i}\,d\,x}+8\,\mathrm{i}\,e^{\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}-16\,\sqrt{2}\,e^{\mathrm{i}\,(c+d\,x)}-40\,\mathrm{i}\,e^{\frac{3}{2}\,\mathrm{i}\,(c+d\,x)}+$$

$$\left.34\,\sqrt{2}\,e^{2\,\mathrm{i}\,(c+d\,x)}+40\,\mathrm{i}\,e^{\frac{5}{2}\,\mathrm{i}\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,\mathrm{i}\,(c+d\,x)}-8\,\mathrm{i}\,e^{\frac{7}{2}\,\mathrm{i}\,(c+d\,x)}+\sqrt{2}\,e^{4\,\mathrm{i}\,(c+d\,x)}-(4+4\,\mathrm{i})\,\sqrt{2}\,e^{\frac{1}{2}\,\mathrm{i}\,(2\,c+d\,x)}\right)$$

$$\left.x\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right)\Big/\left(\left(\left((-1-\mathrm{i})+\sqrt{2}\,e^{\frac{\mathrm{i}\,c}{2}}\right)\,\left(-1+e^{\mathrm{i}\,c}\right)\right.\right.$$

$$\left.\left.\left(\mathrm{i}-2\,\sqrt{2}\,e^{\frac{1}{2}\,\mathrm{i}\,(c+d\,x)}-4\,\mathrm{i}\,e^{\mathrm{i}\,(c+d\,x)}+2\,\sqrt{2}\,e^{\frac{3}{2}\,\mathrm{i}\,(c+d\,x)}+\mathrm{i}\,e^{2\,\mathrm{i}\,(c+d\,x)}\right)^2\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)\right)-$$

$$\left(2\,\mathrm{i}\,\sqrt{2}\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$

$$\frac{4\,(A-B+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}-$$

$$\frac{4\,(A-B+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}-$$

$$\left(\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$

$$\frac{8\,C\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\,\mathrm{Sin}\left[\frac{c}{2}\right]}{d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\left((1-\mathrm{i})\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right.$$

$$\left.\left((1+\mathrm{i})\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-\mathrm{i})\,\mathrm{Sin}\left[\frac{c}{4}\right]-\mathrm{i}\,\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\,\left((-1-\mathrm{i})\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-\mathrm{i})\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-\mathrm{i}\,\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(\left(\left(\frac{1}{2}+\frac{i}{2}\right)\operatorname{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\operatorname{Cos}[c+d\,x]\operatorname{Log}\left[2+\sqrt{2}\operatorname{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\operatorname{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\left(B+C\operatorname{Cos}[c+d\,x]+A\operatorname{Sec}[c+d\,x]\right)\right.\right.$$

$$\left.\left(\left(1+i\right)\operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\operatorname{Cos}\left[\frac{c}{4}\right]-\left(1-i\right)\operatorname{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\operatorname{Sin}\left[\frac{c}{4}\right]\right)\left(\left(-1-i\right)A\operatorname{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\operatorname{Cos}\left[\frac{c}{4}\right]+\left(1-i\right)A\operatorname{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A\operatorname{Sin}\left[\frac{c}{4}\right]\right)\right)\Big/$$

$$\left(\sqrt{2}\,d\sqrt{a\left(1+\operatorname{Cos}[c+d\,x]\right)}\left(2A+C+2B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[2c+2d\,x]\right)\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(8\,i\,A\operatorname{ArcTan}\left[\frac{2\,i\operatorname{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\operatorname{Sin}\left[\frac{c}{2}\right]\right)\operatorname{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\operatorname{Cos}\left[\frac{c}{2}\right]^{2}+4\operatorname{Sin}\left[\frac{c}{2}\right]^{2}}}\right]\operatorname{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\operatorname{Cos}[c+d\,x]\operatorname{Cot}\left[\frac{c}{2}\right]\left(B+C\operatorname{Cos}[c+d\,x]+A\operatorname{Sec}[c+d\,x]\right)\right)\Big/$$

$$\left(d\sqrt{a\left(1+\operatorname{Cos}[c+d\,x]\right)}\left(2A+C+2B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[2c+2d\,x]\right)\sqrt{-2+4\operatorname{Cos}\left[\frac{c}{2}\right]^{2}+4\operatorname{Sin}\left[\frac{c}{2}\right]^{2}}\right)+$$

$$\left(4\sqrt{2}\,A\operatorname{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\operatorname{Cos}[c+d\,x]\operatorname{Csc}\left[\frac{c}{2}\right]\left(B+C\operatorname{Cos}[c+d\,x]+A\operatorname{Sec}[c+d\,x]\right)\right.$$

$$\left.\left(-d\,x\operatorname{Cos}\left[\frac{c}{2}\right]+2\operatorname{Log}\left[\sqrt{2}+2\operatorname{Cos}\left[\frac{d\,x}{2}\right]\operatorname{Sin}\left[\frac{c}{2}\right]+2\operatorname{Cos}\left[\frac{c}{2}\right]\operatorname{Sin}\left[\frac{d\,x}{2}\right]\right]\operatorname{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\operatorname{ArcTan}\left[\frac{2\,i\operatorname{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\operatorname{Sin}\left[\frac{c}{2}\right]\right)\operatorname{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\operatorname{Cos}\left[\frac{c}{2}\right]^{2}+4\operatorname{Sin}\left[\frac{c}{2}\right]^{2}}}\right]\operatorname{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\operatorname{Cos}\left[\frac{c}{2}\right]^{2}+4\operatorname{Sin}\left[\frac{c}{2}\right]^{2}}}\right)\right)\Big/$$

$$\left(d\sqrt{a\left(1+\operatorname{Cos}[c+d\,x]\right)}\left(2A+C+2B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[2c+2d\,x]\right)\left(4\operatorname{Cos}\left[\frac{c}{2}\right]^{2}+4\operatorname{Sin}\left[\frac{c}{2}\right]^{2}\right)\right)+$$

$$\frac{8\,C\operatorname{Cos}\left[\frac{c}{2}\right]\operatorname{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\operatorname{Cos}[c+d\,x]\left(B+C\operatorname{Cos}[c+d\,x]+A\operatorname{Sec}[c+d\,x]\right)\operatorname{Sin}\left[\frac{d\,x}{2}\right]}{d\sqrt{a\left(1+\operatorname{Cos}[c+d\,x]\right)}\left(2A+C+2B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[2c+2d\,x]\right)}$$

- **Problem 406: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[c+d\,x]^{2}\right)\operatorname{Sec}[c+d\,x]^{2}}{\sqrt{a+a\operatorname{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 120 leaves, 6 steps):

$$-\frac{(A-2B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{\sqrt{a}\,d}+\frac{A\,\text{Tan}[c+dx]}{d\,\sqrt{a+a\,\text{Cos}[c+dx]}}$$

Result (type 3, 588 leaves):

$$\left(\text{Cos}\left[\frac{1}{2}(c+dx)\right]\text{Cos}[c+dx]^2\left(C+B\,\text{Sec}[c+dx]+A\,\text{Sec}[c+dx]^2\right)\right.$$
$$\left(-8(A-B+C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]\right]+8(A-B+C)\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\text{Sin}\left[\frac{1}{4}(c+dx)\right]\right]-\right.$$
$$2\sqrt{2}\,(A-2B)\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]-\frac{2\,i\,(A-2B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\left(-1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\left(1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}-$$
$$\frac{2\,i\,(A-2B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\left(1+\sqrt{2}\right)\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\left(-1+\sqrt{2}\right)\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}-$$
$$\frac{(A-2B)\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}-$$
$$\frac{(A-2B)\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)}{-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]}+$$
$$\left.\left.\frac{4A}{\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\text{Sin}\left[\frac{1}{2}(c+dx)\right]}-\frac{4A}{\text{Cos}\left[\frac{1}{2}(c+dx)\right]+\text{Sin}\left[\frac{1}{2}(c+dx)\right]}\right)\right)\Big/$$
$$\left(2\,d\,\sqrt{a\,(1+\text{Cos}[c+dx])}\,\left(2A+C+2B\,\text{Cos}[c+dx]+C\,\text{Cos}[2(c+dx)]\right)\right)$$

## Problem 407: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 169 leaves, 7 steps):

$$\frac{(7A-4B+8C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{4\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B+C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{(A-4B)\,\mathrm{Tan}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 689 leaves):

$$\frac{1}{d\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}}\left(\frac{1}{64}+\frac{i}{64}\right)\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{2\,i\sqrt{2}\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(7A-4B+8C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(-1+\sqrt{2}\right)\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(1+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]}{i+\sqrt{2}}-\right.$$

$$\frac{2\sqrt{2}\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(7A-4B+8C)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\left(1+\sqrt{2}\right)\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\left(-1+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]}{i+\sqrt{2}}+$$

$$(64-64\,i)\,(A-B+C)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]-(64-64\,i)\,(A-B+C)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]+$$

$$\frac{(4+4\,i)\left(-2\,i+\sqrt{2}\right)(7A-4B+8C)\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{i+\sqrt{2}}+\frac{1}{i+\sqrt{2}}$$

$$i\sqrt{2}\left((-1+i)+\sqrt{2}\right)\left((3+i)+\sqrt{2}\right)(7A-4B+8C)\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{1}{i+\sqrt{2}}$$

$$\sqrt{2}\left((-3+i)+\sqrt{2}\right)\left((1+i)+\sqrt{2}\right)(7A-4B+8C)\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\frac{(8-8\,i)\,(A-4B)}{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}+$$

$$\left.\frac{(16-16\,i)\,A\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{(16-16\,i)\,A\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{(8-8\,i)\,(A-4B)}{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}\right)$$

- **Problem 408: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^4}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 213 leaves, 8 steps):

$$-\frac{(9\,A-14\,B+8\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{(7\,A-2\,B+8\,C)\,\text{Tan}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(A-6\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1310 leaves):

$$-\left(\left(\frac{1}{32}-\frac{i}{32}\right)\left((1+i)-i\sqrt{2}\right)\left((27+9\,i)\,A+9\sqrt{2}\,A-(42+14\,i)\,B-14\sqrt{2}\,B+(24+8\,i)\,C+8\sqrt{2}\,C\right)\right.$$
$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{-\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)+$$
$$\left(\left(\frac{1}{32}-\frac{i}{32}\right)\left((1+i)+\sqrt{2}\right)\left((-27+9\,i)\,A+9\sqrt{2}\,A+(42-14\,i)\,B-14\sqrt{2}\,B-(24-8\,i)\,C+8\sqrt{2}\,C\right)\right.$$
$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)-$$
$$\frac{2\,(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+\frac{2\,(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}(c+d\,x)\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$
$$\frac{\left(-18\,A-9\,i\sqrt{2}\,A+28\,B+14\,i\sqrt{2}\,B-16\,C-8\,i\sqrt{2}\,C\right)\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{16\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d\,x])}}+$$
$$\left(\left(\frac{1}{64}+\frac{i}{64}\right)\left((1+i)-i\sqrt{2}\right)\left((27+9\,i)\,A+9\sqrt{2}\,A-(42+14\,i)\,B-14\sqrt{2}\,B+(24+8\,i)\,C+8\sqrt{2}\,C\right)\right.$$
$$\left.\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)-$$
$$\left(\left(\frac{1}{64}+\frac{i}{64}\right)\left((1+i)+\sqrt{2}\right)\left((-27+9\,i)\,A+9\sqrt{2}\,A+(42-14\,i)\,B-14\sqrt{2}\,B-(24-8\,i)\,C+8\sqrt{2}\,C\right)\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right.$$
$$\left.\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{6 d \sqrt{a (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{(7 A-2 B+8 C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{8 d \sqrt{a (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}-$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{6 d \sqrt{a (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$

$$\frac{(-7 A+2 B-8 C) \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{8 d \sqrt{a (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \left(-A\,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+2 B\,\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{4 d \sqrt{a (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right] \left(-A\,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+2 B\,\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{4 d \sqrt{a (1+\text{Cos}[c+d x])} \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}$$

- **Problem 409: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^5}{\sqrt{a+a\,\text{Cos}[c+d x]}}\, dx$$

Optimal (type 3, 259 leaves, 9 steps):

$$\frac{(107 A-72 B+112 C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{64 \sqrt{a}\, d}-\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2} \sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{\sqrt{a}\, d}-\frac{(21 A-56 B+16 C)\,\text{Tan}[c+d x]}{64 d \sqrt{a+a\,\text{Cos}[c+d x]}}+$$

$$\frac{(43 A-8 B+48 C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{96 d \sqrt{a+a\,\text{Cos}[c+d x]}}-\frac{(A-8 B)\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{24 d \sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{A\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]}{4 d \sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 1476 leaves):

$$-\left(\left(\frac{1}{256}+\frac{i}{256}\right) \left((-1+i)+\sqrt{2}\right) \left((321+107 i) A+107 \sqrt{2} A-(216+72 i) B-72 \sqrt{2} B+(336+112 i) C+112 \sqrt{2} C\right)\right.$$

$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4} (c+d x)\right]-\text{Sin}\left[\frac{1}{4} (c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4} (c+d x)\right]}{-\text{Cos}\left[\frac{1}{4} (c+d x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4} (c+d x)\right]-\text{Sin}\left[\frac{1}{4} (c+d x)\right]}\right] \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\right) \Big/ \left(\sqrt{2} \left(i+\sqrt{2}\right) d \sqrt{a (1+\text{Cos}[c+d x])}\right)-$$

$$\left(\left(\frac{1}{256}-\frac{i}{256}\right) \left((1+i)+\sqrt{2}\right) \left((-321+107 i) A+107 \sqrt{2} A+(216-72 i) B-72 \sqrt{2} B-(336-112 i) C+112 \sqrt{2} C\right)\right.$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\text{Sin}\left[\frac{1}{4}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\Bigg)\Bigg/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d x])}\right)+$$

$$\frac{2\,(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d x])}}-\frac{2\,(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\text{Sin}\left[\frac{1}{4}(c+d x)\right]\right]}{d\sqrt{a\,(1+\text{Cos}[c+d x])}}+$$

$$\frac{\left(214\,A+107\,i\sqrt{2}\,A-144\,B-72\,i\sqrt{2}\,B+224\,C+112\,i\sqrt{2}\,C\right)\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{128\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d x])}}-$$

$$\Bigg(\left(\frac{1}{512}-\frac{i}{512}\right)\left((-1+i)+\sqrt{2}\right)\left((321+107\,i)\,A+107\sqrt{2}\,A-(216+72\,i)\,B-72\sqrt{2}\,B+(336+112\,i)\,C+112\sqrt{2}\,C\right)$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\Bigg)\Bigg/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d x])}\right)+$$

$$\Bigg(\left(\frac{1}{512}+\frac{i}{512}\right)\left((1+i)+\sqrt{2}\right)\left((-321+107\,i)\,A+107\sqrt{2}\,A+(216-72\,i)\,B-72\sqrt{2}\,B-(336-112\,i)\,C+112\sqrt{2}\,C\right)$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\Bigg)\Bigg/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\sqrt{a\,(1+\text{Cos}[c+d x])}\right)+$$

$$\frac{(-A+8\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{48\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+\frac{(-21\,A+56\,B-16\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{64\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{8\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{8\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+$$

$$\frac{(A-8\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{48\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^3}+$$

$$\frac{(21\,A-56\,B+16\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]}{64\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(19\,A\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]-8\,B\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+16\,C\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}{32\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(19\,A\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]-8\,B\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+16\,C\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}{32\,d\sqrt{a\,(1+\text{Cos}[c+d x])}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}$$

- **Problem 414: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 131 leaves, 6 steps):

$$\frac{2\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{a^{3/2}\,d}-\frac{(5\,A-B-3\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B+C)\,\text{Sin}[c+d x]}{2\,d\,(a+a\,\text{Cos}[c+d x])^{3/2}}$$

Result (type 3, 2385 leaves):

$$-\Bigg(\Bigg((2-2\,i)\,A\left(1+e^{i c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i c}{2}}+(16-16\,i)\,e^{\frac{3 i c}{2}+i d x}+(20+20\,i)\sqrt{2}\,e^{2 i c+\frac{3 i d x}{2}}-(34-34\,i)\,e^{\frac{5 i c}{2}+2 i d x}-$$
$$(20+20\,i)\sqrt{2}\,e^{3 i c+\frac{5 i d x}{2}}+(16-16\,i)\,e^{\frac{7 i c}{2}+3 i d x}+(4+4\,i)\sqrt{2}\,e^{4 i c+\frac{7 i d x}{2}}-(1-i)\,e^{\frac{9 i c}{2}+4 i d x}+8\,i\,e^{\frac{1}{2} i (c+d x)}-16\sqrt{2}\,e^{i (c+d x)}-$$
$$40\,i\,e^{\frac{3}{2} i (c+d x)}+34\sqrt{2}\,e^{2 i (c+d x)}+40\,i\,e^{\frac{5}{2} i (c+d x)}-16\sqrt{2}\,e^{3 i (c+d x)}-8\,i\,e^{\frac{7}{2} i (c+d x)}+\sqrt{2}\,e^{4 i (c+d x)}-(4+4\,i)\sqrt{2}\,e^{\frac{1}{2} i (2 c+d x)}\Big)$$
$$x\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Cos}[c+d x]\,(B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\Bigg)\Bigg/\Bigg(\Big(\left((-1-i)+\sqrt{2}\,e^{\frac{i c}{2}}\right)\left(-1+e^{i c}\right)$$
$$\left(i-2\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}-4\,i\,e^{i (c+d x)}+2\sqrt{2}\,e^{\frac{3}{2} i (c+d x)}+i\,e^{2 i (c+d x)}\right)^2(a\,(1+\text{Cos}[c+d x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\Big)\Bigg)-$$
$$\left(4\,i\sqrt{2}\,A\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Cos}[c+d x]\,(B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\right)\Big/$$
$$\left(d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\right)+$$
$$\left(2\,(5\,A-B-3\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Cos}[c+d x]\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right](B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\right)\Big/$$
$$\left(d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\right)-$$
$$\left(2\,(5\,A-B-3\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Cos}[c+d x]\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]\right](B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\right)\Big/$$
$$\left(d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\right)-$$
$$\left(2\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Cos}[c+d x]\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right](B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])\right)\Big/$$
$$\left(d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d x]+C\,\text{Cos}[2\,c+2\,d x])\right)+$$
$$\Bigg((1-i)\sqrt{2}\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d x}{4}\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Cos}[c+d x]\,(B+C\,\text{Cos}[c+d x]+A\,\text{Sec}[c+d x])$$

$$\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A\,\text{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left((1+i)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right](B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\left((1+i)\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}\right]-(1-i)\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,\text{Sin}\left[\frac{c}{4}\right]\right)\left((-1-i)\,A\,\text{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{4}\right]+(1-i)\,A\,\text{Sin}\left[\frac{c}{4}\right]-i\sqrt{2}\,A\,\text{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Big/$$

$$\left(\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(16\,i\,A\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,\text{Cot}\left[\frac{c}{2}\right](B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}\right)+$$

$$\left(8\sqrt{2}\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{c}{2}\right](B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\left.\left(-d\,x\,\text{Cos}\left[\frac{c}{2}\right]+2\,\text{Log}\left[\sqrt{2}+2\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]+2\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]\right]\text{Sin}\left[\frac{c}{2}\right]+\frac{4\,i\sqrt{2}\,\text{ArcTan}\left[\frac{2\,i\,\text{Cos}\left[\frac{c}{2}\right]-i\left(-\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}\right]\right)\text{Tan}\left[\frac{d\,x}{4}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right]\text{Cos}\left[\frac{c}{2}\right]}{\sqrt{-2+4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2}}\right)\right)\Big/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\left(4\,\text{Cos}\left[\frac{c}{2}\right]^2+4\,\text{Sin}\left[\frac{c}{2}\right]^2\right)\right)+$$

$$\frac{(-A+B-C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\text{Cos}[c+d\,x]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}+$$

$$\frac{(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]\,\left(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x]\right)}{d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\,\left(\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right)^2}$$

- **Problem 415: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 173 leaves, 7 steps):

$$-\frac{(3\,A-2\,B)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{(9\,A-5\,B+C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B+C)\,\text{Tan}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(3\,A-B+C)\,\text{Tan}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1661 leaves):

$$-\left(2\,(9\,A-5\,B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right)\Big/$$
$$\left(d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\right)+$$
$$\left(2\,(9\,A-5\,B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right)\Big/$$
$$\left(d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\right)-$$
$$\left(2\,\sqrt{2}\,(3\,A-2\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right)\Big/$$
$$\left(d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\right)-$$
$$\left(2\,i\,(3\,A-2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$
$$\left.\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/\left(d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\,\left(-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$
$$\left(2\,i\,(3\,A-2\,B)\,\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\text{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\text{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$
$$\left.\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/\left(d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\,\left(-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$
$$\left((3\,A-2\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\,\left(\sqrt{2}-2\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(d\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{3/2}\,\left(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]\right)\,\left(-1+\sqrt{2}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left((3A-2B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Cos}[c+dx]^2\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right]\,\left(C+B\,\mathrm{Sec}[c+dx]+A\,\mathrm{Sec}[c+dx]^2\right)\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$
$$\frac{(A-B+C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Cos}[c+dx]^2\left(C+B\,\mathrm{Sec}[c+dx]+A\,\mathrm{Sec}[c+dx]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right)^2}+$$
$$\frac{(-A+B-C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Cos}[c+dx]^2\left(C+B\,\mathrm{Sec}[c+dx]+A\,\mathrm{Sec}[c+dx]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right)^2}+$$
$$\frac{4A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Cos}[c+dx]^2\left(C+B\,\mathrm{Sec}[c+dx]+A\,\mathrm{Sec}[c+dx]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}-$$
$$\frac{4A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\mathrm{Cos}[c+dx]^2\left(C+B\,\mathrm{Sec}[c+dx]+A\,\mathrm{Sec}[c+dx]^2\right)}{d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\,(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}$$

- **Problem 416: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]^3}{(a+a\,\mathrm{Cos}[c+dx])^{3/2}}\,dx$$

Optimal (type 3, 232 leaves, 8 steps):

$$\frac{(19A-12B+8C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{4a^{3/2}d}-\frac{(13A-9B+5C)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+dx]}{\sqrt{2}\,\sqrt{a+a\,\mathrm{Cos}[c+dx]}}\right]}{2\sqrt{2}\,a^{3/2}d}-$$
$$\frac{(7A-6B+2C)\,\mathrm{Tan}[c+dx]}{4ad\sqrt{a+a\,\mathrm{Cos}[c+dx]}}-\frac{(A-B+C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{2d\,(a+a\,\mathrm{Cos}[c+dx])^{3/2}}+\frac{(2A-B+C)\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]}{2ad\sqrt{a+a\,\mathrm{Cos}[c+dx]}}$$

Result (type 3, 1302 leaves):

$$-\left(\left(\frac{1}{8}+\frac{i}{8}\right)\left((-1+i)+\sqrt{2}\right)\left((57+19i)A+19\sqrt{2}A-(36+12i)B-12\sqrt{2}B+(24+8i)C+8\sqrt{2}C\right)\right.$$
$$\left.\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]}{-\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{1}{4}(c+dx)\right]-\mathrm{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\mathrm{Cos}[c+dx]))^{3/2}\right)-$$
$$\left(\left(\frac{1}{8}-\frac{i}{8}\right)\left((1+i)+\sqrt{2}\right)\left((-57+19i)A+19\sqrt{2}A+(36-12i)B-12\sqrt{2}B-(24-8i)C+8\sqrt{2}C\right)\right.$$

$$\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\text{Sin}\left[\frac{1}{4}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+d x)\right]}{\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\Bigg)\Bigg/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\right)+$$

$$\frac{(13 A-9 B+5 C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}+\frac{(-13 A+9 B-5 C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\text{Sin}\left[\frac{1}{4}(c+d x)\right]\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}+$$

$$\frac{\left(38 A+19 i\sqrt{2}\,A-24 B-12 i\sqrt{2}\,B+16 C+8 i\sqrt{2}\,C\right)\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{4\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}}-$$

$$\Bigg(\left(\frac{1}{16}-\frac{i}{16}\right)\left((-1+i)+\sqrt{2}\right)\left((57+19 i)A+19\sqrt{2}\,A-(36+12 i)B-12\sqrt{2}\,B+(24+8 i)C+8\sqrt{2}\,C\right)$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\Bigg)\Bigg/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\right)+$$

$$\Bigg(\left(\frac{1}{16}+\frac{i}{16}\right)\left((1+i)+\sqrt{2}\right)\left((-57+19 i)A+19\sqrt{2}\,A+(36-12 i)B-12\sqrt{2}\,B-(24-8 i)C+8\sqrt{2}\,C\right)\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3$$
$$\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\Bigg)\Bigg/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\right)+$$

$$\frac{(-A+B-C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{1}{4}(c+d x)\right]-\text{Sin}\left[\frac{1}{4}(c+d x)\right]\right)^2}+\frac{(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{1}{4}(c+d x)\right]+\text{Sin}\left[\frac{1}{4}(c+d x)\right]\right)^2}+$$

$$\frac{(-5 A+4 B)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$

$$\frac{(5 A-4 B)\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^3}{2 d\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}$$

- **Problem 417: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^4}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 284 leaves, 9 steps):

$$-\frac{(47A-38B+24C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{8a^{3/2}d}+\frac{(17A-13B+9C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{2\sqrt{2}\,a^{3/2}d}+\frac{(21A-14B+12C)\,\text{Tan}[c+dx]}{8ad\sqrt{a+a\,\text{Cos}[c+dx]}}-\frac{(13A-12B+6C)\,\text{Sec}[c+dx]\,\text{Tan}[c+dx]}{12ad\sqrt{a+a\,\text{Cos}[c+dx]}}-\frac{(A-B+C)\,\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{2d\,(a+a\,\text{Cos}[c+dx])^{3/2}}+\frac{(5A-3B+3C)\,\text{Sec}[c+dx]^2\,\text{Tan}[c+dx]}{6ad\sqrt{a+a\,\text{Cos}[c+dx]}}$$

Result (type 3, 1476 leaves):

$$-\left(\left(\frac{1}{16}-\frac{i}{16}\right)\left((1+i)-i\sqrt{2}\right)\left((141+47i)A+47\sqrt{2}A-(114+38i)B-38\sqrt{2}B+(72+24i)C+24\sqrt{2}C\right)\right.$$
$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{-\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\right)+$$
$$\left(\left(\frac{1}{16}-\frac{i}{16}\right)\left((1+i)+\sqrt{2}\right)\left((-141+47i)A+47\sqrt{2}A+(114-38i)B-38\sqrt{2}B-(72-24i)C+24\sqrt{2}C\right)\right.$$
$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\text{Sin}\left[\frac{1}{4}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}(c+dx)\right]}{\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\right)\Big/$$
$$\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\right)+\frac{(-17A+13B-9C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+dx)\right]-\text{Sin}\left[\frac{1}{4}(c+dx)\right]\right]}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}}+$$
$$\frac{(17A-13B+9C)\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Log}\left[\text{Cos}\left[\frac{1}{4}(c+dx)\right]+\text{Sin}\left[\frac{1}{4}(c+dx)\right]\right]}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}}+$$
$$\frac{\left(-94A-47i\sqrt{2}A+76B+38i\sqrt{2}B-48C-24i\sqrt{2}C\right)\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]}{8\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}}+$$
$$\left(\left(\frac{1}{32}+\frac{i}{32}\right)\left((1+i)-i\sqrt{2}\right)\left((141+47i)A+47\sqrt{2}A-(114+38i)B-38\sqrt{2}B+(72+24i)C+24\sqrt{2}C\right)\right.$$
$$\left.\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\right)-$$
$$\left(\left(\frac{1}{32}+\frac{i}{32}\right)\left((1+i)+\sqrt{2}\right)\left((-141+47i)A+47\sqrt{2}A+(114-38i)B-38\sqrt{2}B-(72-24i)C+24\sqrt{2}C\right)\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\right.$$
$$\left.\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]\right]\right)\Big/\left(\sqrt{2}\left(i+\sqrt{2}\right)d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\right)+$$

$$\frac{(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right)^2}+\frac{(-A+B-C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{3\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(17\,A-10\,B+8\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}-$$

$$\frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{3\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$

$$\frac{(-17\,A+10\,B-8\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(-3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(-3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}$$

- **Problem 422: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 171 leaves, 7 steps):

$$\frac{2\,A\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{5/2}\,d}-\frac{(43\,A-3\,B-5\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(11\,A-3\,B-5\,C)\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 2329 leaves):

$$-\Bigg(\Bigg((4-4\,i)\,A\left(1+e^{i\,c}\right)\Big(\sqrt{2}-(1-i)\,e^{\frac{i\,c}{2}}+(16-16\,i)\,e^{\frac{3\,i\,c}{2}+i\,d\,x}+(20+20\,i)\,\sqrt{2}\,e^{2\,i\,c+\frac{3\,i\,d\,x}{2}}-(34-34\,i)\,e^{\frac{5\,i\,c}{2}+2\,i\,d\,x}-$$

$$(20+20\,i)\,\sqrt{2}\,e^{3\,i\,c+\frac{5\,i\,d\,x}{2}}+(16-16\,i)\,e^{\frac{7\,i\,c}{2}+3\,i\,d\,x}+(4+4\,i)\,\sqrt{2}\,e^{4\,i\,c+\frac{7\,i\,d\,x}{2}}-(1-i)\,e^{\frac{9\,i\,c}{2}+4\,i\,d\,x}+8\,i\,e^{\frac{1}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{i\,(c+d\,x)}-$$

$$40\,i\,e^{\frac{3}{2}\,i\,(c+d\,x)}+34\,\sqrt{2}\,e^{2\,i\,(c+d\,x)}+40\,i\,e^{\frac{5}{2}\,i\,(c+d\,x)}-16\,\sqrt{2}\,e^{3\,i\,(c+d\,x)}-8\,i\,e^{\frac{7}{2}\,i\,(c+d\,x)}+\sqrt{2}\,e^{4\,i\,(c+d\,x)}-(4+4\,i)\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(2\,c+d\,x)}\Big)$$

$$x\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\text{Cos}[c+d\,x]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\Bigg)\Bigg/\left(\left((-1-i)+\sqrt{2}\,e^{\frac{i\,c}{2}}\right)\left(-1+e^{i\,c}\right)\right.$$

$$\left(\mathrm{i}-2\sqrt{2}\,e^{\frac{1}{2}\mathrm{i}(c+dx)}-4\,\mathrm{i}\,e^{\mathrm{i}(c+dx)}+2\sqrt{2}\,e^{\frac{3}{2}\mathrm{i}(c+dx)}+\mathrm{i}\,e^{2\mathrm{i}(c+dx)}\right)^2 (a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\Big)\Big)-$$

$$\left(8\,\mathrm{i}\sqrt{2}\,A\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,(B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\right)\Big/$$

$$\left(d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\right)+$$

$$\left((43A-3B-5C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right](B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\right)\Big/$$

$$\left(2d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\right)+$$

$$\left((-43A+3B+5C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]\right](B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\right)\Big/$$

$$\left(2d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\right)-$$

$$\left(4\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right](B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\right)\Big/$$

$$\left(d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\right)+$$

$$\Bigg((2-2\,\mathrm{i})\sqrt{2}\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{dx}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{dx}{4}\right]}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,(B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])$$

$$\left((1+\mathrm{i})\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-\mathrm{i})\,\mathrm{Sin}\left[\frac{c}{4}\right]-\mathrm{i}\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\left((-1-\mathrm{i})\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-\mathrm{i})\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-\mathrm{i}\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Big/$$

$$\left(d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\Bigg((1+\mathrm{i})\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right](B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])$$

$$\left((1+\mathrm{i})\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}\right]-(1-\mathrm{i})\,\mathrm{Sin}\left[\frac{c}{4}\right]-\mathrm{i}\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\left((-1-\mathrm{i})\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+\sqrt{2}\,A\,\mathrm{Cos}\left[\frac{c}{4}\right]+(1-\mathrm{i})\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]-\mathrm{i}\sqrt{2}\,A\,\mathrm{Sin}\left[\frac{c}{4}\right]\right)\Bigg)\Big/$$

$$\left(d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$

$$\left(32\,\mathrm{i}\,A\,\mathrm{ArcTan}\left[\frac{2\,\mathrm{i}\,\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\left(-\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\mathrm{Tan}\left[\frac{dx}{4}\right]}{\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}}\right]\mathrm{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\mathrm{Cos}[c+dx]\,\mathrm{Cot}\left[\frac{c}{2}\right](B+C\,\mathrm{Cos}[c+dx]+A\,\mathrm{Sec}[c+dx])\right)\Big/$$

$$\left(d\,(a(1+\mathrm{Cos}[c+dx]))^{5/2}(2A+C+2B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[2c+2dx])\sqrt{-2+4\,\mathrm{Cos}\left[\frac{c}{2}\right]^2+4\,\mathrm{Sin}\left[\frac{c}{2}\right]^2}\right)+$$

$$\Bigg(16\sqrt{2}\;A\,\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\,\text{Cos}[c+d\,x]\,\text{Csc}\Big[\frac{c}{2}\Big]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])$$

$$\left(-d\,x\,\text{Cos}\Big[\frac{c}{2}\Big]+2\,\text{Log}\Big[\sqrt{2}+2\,\text{Cos}\Big[\frac{d\,x}{2}\Big]\,\text{Sin}\Big[\frac{c}{2}\Big]+2\,\text{Cos}\Big[\frac{c}{2}\Big]\,\text{Sin}\Big[\frac{d\,x}{2}\Big]\Big]\,\text{Sin}\Big[\frac{c}{2}\Big]+\frac{4\,\mathrm{i}\,\sqrt{2}\,\text{ArcTan}\Big[\frac{2\,\mathrm{i}\,\text{Cos}[\frac{c}{2}]-\mathrm{i}\,\left(-\sqrt{2}+2\,\text{Sin}[\frac{c}{2}]\right)\,\text{Tan}[\frac{d\,x}{4}]}{\sqrt{-2+4\,\text{Cos}[\frac{c}{2}]^2+4\,\text{Sin}[\frac{c}{2}]^2}}\Big]\,\text{Cos}\Big[\frac{c}{2}\Big]}{\sqrt{-2+4\,\text{Cos}[\frac{c}{2}]^2+4\,\text{Sin}[\frac{c}{2}]^2}}\right)\Bigg)\Bigg/$$

$$\left(d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\,\left(4\,\text{Cos}\Big[\frac{c}{2}\Big]^2+4\,\text{Sin}\Big[\frac{c}{2}\Big]^2\right)\right)-$$

$$\Bigg(\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]\,\text{Cos}[c+d\,x]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])$$

$$\left(19\,A\,\text{Sin}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]-11\,B\,\text{Sin}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]+3\,C\,\text{Sin}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]+11\,A\,\text{Sin}\Big[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\Big]-3\,B\,\text{Sin}\Big[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\Big]-5\,C\,\text{Sin}\Big[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\Big]\right)\Bigg)\Bigg/$$

$$\left(8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 423: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 217 leaves, 8 steps):

$$-\frac{(5\,A-2\,B)\,\text{ArcTanh}\Big[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\Big]}{a^{5/2}\,d}+\frac{(115\,A-43\,B+3\,C)\,\text{ArcTanh}\Big[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\Big]}{16\,\sqrt{2}\,a^{5/2}\,d}-$$

$$\frac{(A-B+C)\,\text{Tan}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(15\,A-7\,B-C)\,\text{Tan}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(35\,A-11\,B+3\,C)\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1411 leaves):

$$\left((-115\,A+43\,B-3\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\right)\Big/$$
$$\left(2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$
$$\left((115\,A-43\,B+3\,C)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]\right]\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\right)\Big/$$
$$\left(2\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)-$$
$$\left(4\,\sqrt{2}\,(5\,A-2\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[\sqrt{2}+2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\right)\Big/$$
$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)-$$
$$\left(4\,\mathrm{i}\,(5\,A-2\,B)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{-\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\right.$$
$$\left.\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$
$$\left(4\,\mathrm{i}\,(5\,A-2\,B)\,\mathrm{ArcTan}\left[\frac{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}{\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{4}+\frac{d\,x}{4}\right]-\mathrm{Sin}\left[\frac{c}{4}+\frac{d\,x}{4}\right]}\right]\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\right.$$
$$\left.\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$
$$\left(2\,(5\,A-2\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[2-\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\,\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)-$$
$$\left(2\,(5\,A-2\,B)\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Log}\left[2+\sqrt{2}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\,\left(\sqrt{2}-2\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\Big/$$
$$\left(d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\,\left(-1+\sqrt{2}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)+$$
$$\left(\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\mathrm{Cos}[c+d\,x]\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\,\left(24\,A\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+8\,B\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-8\,C\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+75\,A\,\mathrm{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]-\right.\right.$$
$$\left.\left.19\,B\,\mathrm{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]+11\,C\,\mathrm{Sin}\left[\frac{3\,c}{2}+\frac{3\,d\,x}{2}\right]+35\,A\,\mathrm{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]-11\,B\,\mathrm{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[\frac{5\,c}{2}+\frac{5\,d\,x}{2}\right]\right)\right)\Big/$$
$$\left(16\,d\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 424: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3}{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 280 leaves, 9 steps):

$$\frac{(39\,A-20\,B+8\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,a^{5/2}\,d}-\frac{(219\,A-115\,B+43\,C)\,\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(63\,A-35\,B+11\,C)\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$
$$\frac{(A-B+C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(19\,A-11\,B+3\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(31\,A-15\,B+7\,C)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 1444 leaves):

$$-\left(\left(\frac{1}{4}+\frac{i}{4}\right)\left((-1+i)+\sqrt{2}\right)\left((117+39\,i)\,A+39\,\sqrt{2}\,A-(60+20\,i)\,B-20\,\sqrt{2}\,B+(24+8\,i)\,C+8\,\sqrt{2}\,C\right)\right.$$
$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{-\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right)\Big/\left(\sqrt{2}\,\left(i+\sqrt{2}\right)\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)-$$
$$\left(\left(\frac{1}{4}-\frac{i}{4}\right)\left((1+i)+\sqrt{2}\right)\left((-117+39\,i)\,A+39\,\sqrt{2}\,A+(60-20\,i)\,B-20\,\sqrt{2}\,B-(24-8\,i)\,C+8\,\sqrt{2}\,C\right)\right.$$
$$\left.\text{ArcTan}\left[\frac{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\sqrt{2}\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]}\right]\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right)\Big/\left(\sqrt{2}\,\left(i+\sqrt{2}\right)\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)+$$
$$\frac{(219\,A-115\,B+43\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right]}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}+$$
$$\frac{(-219\,A+115\,B-43\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right]}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}+$$
$$\frac{\left(78\,A+39\,i\,\sqrt{2}\,A-40\,B-20\,i\,\sqrt{2}\,B+16\,C+8\,i\,\sqrt{2}\,C\right)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[\sqrt{2}+2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,\left(i+\sqrt{2}\right)\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}-$$
$$\left(\left(\frac{1}{8}-\frac{i}{8}\right)\left((-1+i)+\sqrt{2}\right)\left((117+39\,i)\,A+39\,\sqrt{2}\,A-(60+20\,i)\,B-20\,\sqrt{2}\,B+(24+8\,i)\,C+8\,\sqrt{2}\,C\right)\right.$$
$$\left.\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Log}\left[2-\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)\Big/\left(\sqrt{2}\,\left(i+\sqrt{2}\right)\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)+$$
$$\left(\left(\frac{1}{8}+\frac{i}{8}\right)\left((1+i)+\sqrt{2}\right)\left((-117+39\,i)\,A+39\,\sqrt{2}\,A+(60-20\,i)\,B-20\,\sqrt{2}\,B-(24-8\,i)\,C+8\,\sqrt{2}\,C\right)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\right.$$
$$\left.\text{Log}\left[2+\sqrt{2}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\sqrt{2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\right)\Big/\left(\sqrt{2}\,\left(i+\sqrt{2}\right)\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)+$$

$$\frac{(-A+B-C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right)^4}+\frac{(-27\,A+19\,B-11\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{(A-B+C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right)^4}+$$

$$\frac{(27\,A-19\,B+11\,C)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{4}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{(-9\,A+4\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$

$$\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{(9\,A-4\,B)\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5}{d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

- **Problem 431: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 211 leaves, 8 steps):

$$\frac{2\,a\,(9\,A+7\,(B+C))\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{15\,d}+\frac{10\,a\,(11\,A+11\,B+9\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{231\,d}+$$

$$\frac{10\,a\,(11\,A+11\,B+9\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{231\,d}+\frac{2\,a\,(9\,A+7\,(B+C))\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+$$

$$\frac{2\,a\,(11\,A+11\,B+9\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{77\,d}+\frac{2\,a\,(B+C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}+\frac{2\,a\,C\,\text{Cos}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{11\,d}$$

Result (type 5, 1344 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(-\frac{(9\,A+7\,B+7\,C)\,\text{Cot}[c]}{15\,d}+\frac{(506\,A+506\,B+435\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{1848\,d}+\frac{(18\,A+19\,B+19\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{180\,d}+\right.$$
$$\frac{(44\,A+44\,B+57\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{1232\,d}+\frac{(B+C)\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{72\,d}+\frac{C\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{176\,d}+\frac{(506\,A+506\,B+435\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{1848\,d}+$$
$$\left.\frac{(18\,A+19\,B+19\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{180\,d}+\frac{(44\,A+44\,B+57\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{1232\,d}+\frac{(B+C)\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{72\,d}+\frac{C\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{176\,d}\right)-$$

$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$5\,B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{77\,d\,\sqrt{1+\text{Cot}[c]^2}}15\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{30\,d}7\,B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{30\,d}7\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 432: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 177 leaves, 7 steps) :

$$\frac{2\,a\,(9\,A+9\,B+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{15\,d}+\frac{2\,a\,(7\,A+5\,(B+C))\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+\frac{2\,a\,(7\,A+5\,(B+C))\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,(9\,A+9\,B+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{2\,a\,(B+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,a\,C\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 1292 leaves) :

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(-\frac{(9\,A+9\,B+7\,C)\,\text{Cot}[c]}{15\,d}+\frac{(28\,A+23\,B+23\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{84\,d}+\frac{(18\,A+18\,B+19\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{180\,d}+\frac{(B+C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{28\,d}+\frac{C\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{72\,d}+\frac{(28\,A+23\,B+23\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{84\,d}+\frac{(18\,A+18\,B+19\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{180\,d}+\frac{(B+C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{28\,d}+\frac{C\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{72\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}\right.$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$5\,B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},\,-\frac{1}{4}\right\},\,\left\{\frac{3}{4}\right\},\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,B\,(1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{30\,d}7\,C\,(1+\text{Cos}[c+d\,x])\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 433: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])\ \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 144 leaves, 6 steps):

$$\frac{2\,a\,(5\,A+3\,(B+C))\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{2\,a\,(7\,A+7\,B+5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+\frac{2\,a\,(7\,A+7\,B+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,(B+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a\,C\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 1240 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\left(-\frac{(5\,A+3\,B+3\,C)\,\text{Cot}[c]}{5\,d}+\frac{(28\,A+28\,B+23\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{84\,d}+\frac{(B+C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{10\,d}+\frac{C\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{28\,d}+\frac{(28\,A+28\,B+23\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{84\,d}+\frac{(B+C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{10\,d}+\frac{C\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{28\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}\right.$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,B\,(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\;\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,C\,(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\;\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 434: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a + a \operatorname{Cos}[c + d x]) \left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right)}{\sqrt{\operatorname{Cos}[c + d x]}} \, dx$$

Optimal (type 4, 107 leaves, 5 steps):

$$\frac{2 a (5 A + 5 B + 3 C) \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right]}{5 d} + \frac{2 a (3 A + B + C) \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right]}{3 d} + \frac{2 a (B + C) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Sin}[c + d x]}{3 d} + \frac{2 a C \operatorname{Cos}[c + d x]^{3/2} \operatorname{Sin}[c + d x]}{5 d}$$

Result (type 5, 1186 leaves):

$$a \left( \sqrt{\operatorname{Cos}[c + d x]} (1 + \operatorname{Cos}[c + d x]) \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2 \right.$$

$$\left(-\frac{(5 A + 5 B + 3 C) \operatorname{Cot}[c]}{5 d} + \frac{(B + C) \operatorname{Cos}[d x] \operatorname{Sin}[c]}{3 d} + \frac{C \operatorname{Cos}[2 d x] \operatorname{Sin}[2 c]}{10 d} + \frac{(B + C) \operatorname{Cos}[c] \operatorname{Sin}[d x]}{3 d} + \frac{C \operatorname{Cos}[2 c] \operatorname{Sin}[2 d x]}{10 d}\right) -$$

$$\frac{1}{d \sqrt{1 + \operatorname{Cot}[c]^2}} A (1 + \operatorname{Cos}[c + d x]) \operatorname{Csc}[c] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]$$

$$\operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2 \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1 - \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1 + \operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1 + \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} - \frac{1}{3 d \sqrt{1 + \operatorname{Cot}[c]^2}}$$

$$B (1 + \operatorname{Cos}[c + d x]) \operatorname{Csc}[c] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2 \operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1 - \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1 + \operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1 + \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} -$$

$$\frac{1}{3 d \sqrt{1 + \operatorname{Cot}[c]^2}} C (1 + \operatorname{Cos}[c + d x]) \operatorname{Csc}[c] \operatorname{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2$$

$$\operatorname{Sec}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1 - \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1 + \operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1 + \operatorname{Sin}[d x - \operatorname{ArcTan}[\operatorname{Cot}[c]]]} - \frac{1}{2 d} A (1 + \operatorname{Cos}[c + d x]) \operatorname{Csc}[c] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 435: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 101 leaves, 5 steps):

$$-\frac{2\,a\,(A-B-C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{d}+\frac{2\,a\,(3\,A+3\,B+C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 1173 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(-\frac{(-2\,A+B+C+B\,\text{Cos}[2\,c]+C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{2\,d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{d}\right)-$$

$$\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 436: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 100 leaves, 5 steps):

$$-\frac{2\,a\,(A+B-C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{d}+\frac{2\,a\,(A+3\,(B+C))\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,(A+B)\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 1180 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(-\frac{(-2\,A-2\,B+C+C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{2\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+3\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x])}{3\,d}\right)-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]} + \frac{1}{2\,d}A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 437: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 139 leaves, 6 steps):

$$-\frac{2\,a\,(3\,A+5\,(B+C))\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{2\,a\,(A+B+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}+\frac{2\,a\,A\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,a\,(A+B)\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,(3\,A+5\,(B+C))\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 1228 leaves):

$$a\left(\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\right.$$

$$\left(\frac{(3\,A+5\,B+5\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{5\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{5\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,A\,\text{Sin}[c]+5\,A\,\text{Sin}[d\,x]+5\,B\,\text{Sin}[d\,x])}{15\,d}+\right.$$

$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(5\,A\,\text{Sin}[c]+5\,B\,\text{Sin}[c]+9\,A\,\text{Sin}[d\,x]+15\,B\,\text{Sin}[d\,x]+15\,C\,\text{Sin}[d\,x])}{15\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}+\frac{1}{10\,d}3\,A\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)+\frac{1}{2\,d}B\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\right)+\frac{1}{2\,d}C\,(1+\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\left(\left(\mathrm{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\right]\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 438: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d x])\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{9/2}}\,dx$$

Optimal (type 4, 177 leaves, 7 steps) :

$$-\frac{2 a\ (3 A+3 B+5 C)\ \text{EllipticE}\left[\frac{1}{2}\ (c+d x),\ 2\right]}{5 d}+\frac{2 a\ (5 A+7\ (B+C))\ \text{EllipticF}\left[\frac{1}{2}\ (c+d x),\ 2\right]}{21 d}+$$

$$\frac{2 a A\,\text{Sin}[c+d x]}{7 d\,\text{Cos}[c+d x]^{7/2}}+\frac{2 a\ (A+B)\ \text{Sin}[c+d x]}{5 d\,\text{Cos}[c+d x]^{5/2}}+\frac{2 a\ (5 A+7\ (B+C))\ \text{Sin}[c+d x]}{21 d\,\text{Cos}[c+d x]^{3/2}}+\frac{2 a\ (3 A+3 B+5 C)\ \text{Sin}[c+d x]}{5 d\,\sqrt{\text{Cos}[c+d x]}}$$

Result (type 5, 1284 leaves) :

$$a\left(\sqrt{\text{Cos}[c+d x]}\ (1+\text{Cos}[c+d x])\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\right.$$

$$\left(\frac{(3 A+3 B+5 C)\ \text{Csc}[c]\ \text{Sec}[c]}{5 d}+\frac{A\,\text{Sec}[c]\ \text{Sec}[c+d x]^4\ \text{Sin}[d x]}{7 d}+\frac{\text{Sec}[c]\ \text{Sec}[c+d x]^3\ (5 A\,\text{Sin}[c]+7 A\,\text{Sin}[d x]+7 B\,\text{Sin}[d x])}{35 d}+\right.$$

$$\frac{\text{Sec}[c]\ \text{Sec}[c+d x]^2\ (21 A\,\text{Sin}[c]+21 B\,\text{Sin}[c]+25 A\,\text{Sin}[d x]+35 B\,\text{Sin}[d x]+35 C\,\text{Sin}[d x])}{105 d}+\frac{1}{105 d}$$

$$\left.\text{Sec}[c]\ \text{Sec}[c+d x]\ (25 A\,\text{Sin}[c]+35 B\,\text{Sin}[c]+35 C\,\text{Sin}[c]+63 A\,\text{Sin}[d x]+63 B\,\text{Sin}[d x]+105 C\,\text{Sin}[d x])\right)-\frac{1}{21 d\sqrt{1+\text{Cot}[c]^2}}$$

$$5 A\ (1+\text{Cos}[c+d x])\ \text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\ \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3 d\sqrt{1+\text{Cot}[c]^2}}$$

$$B\ (1+\text{Cos}[c+d x])\ \text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\ \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\;\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\;\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\;\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\;\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\;+\frac{1}{10\,d}3\,A\,(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\left(\left(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\;\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{10\,d}3\,B\,(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\left(\left(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\;\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\;\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}\;\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\;\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\;\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}C\,(1+\text{Cos}[c+d\,x])\;\text{Csc}[c]\;\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^2$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 439: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 251 leaves, 9 steps):

$$\frac{4\,a^2\,(9\,A+8\,B+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+$$
$$\frac{4\,a^2\,(66\,A+55\,B+50\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{231\,d}+\frac{4\,a^2\,(66\,A+55\,B+50\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{231\,d}+$$
$$\frac{4\,a^2\,(9\,A+8\,B+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{45\,d}+\frac{2\,a^2\,(99\,A+121\,B+89\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{693\,d}+$$
$$\frac{2\,C\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{11\,d}+\frac{2\,(11\,B+4\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{99\,d}$$

Result (type 5, 1374 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(-\frac{(9\,A+8\,B+7\,C)\,\text{Cot}[c]}{15\,d}+\frac{(1122\,A+1012\,B+941\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3696\,d}+\frac{(36\,A+37\,B+38\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{360\,d}+\right.$$
$$\frac{(44\,A+88\,B+101\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{2464\,d}+\frac{(B+2\,C)\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{144\,d}+\frac{C\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{352\,d}+\frac{(1122\,A+1012\,B+941\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3696\,d}+$$
$$\left.\frac{(36\,A+37\,B+38\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{360\,d}+\frac{(44\,A+88\,B+101\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{2464\,d}+\frac{(B+2\,C)\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{144\,d}+\frac{C\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{352\,d}\right)-$$

$$\frac{1}{7\,d\,\sqrt{1+\text{Cot}[c]^2}}2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$5\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{231\,d\,\sqrt{1+\text{Cot}[c]^2}}50\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{10\,d}3\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{15\,d}4\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{30\,d}7\,C\,(a+a\,\text{Cos}[c+d x])^2\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 440: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^2\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)dx$$

Optimal (type 4, 215 leaves, 8 steps):

$$\frac{4 a^2 (12 A+9 B+8 C)\ \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{15 d}+\frac{4 a^2 (7 A+6 B+5 C)\ \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{21 d}+$$
$$\frac{4 a^2 (7 A+6 B+5 C)\sqrt{\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{21 d}+\frac{2 a^2 (21 A+27 B+19 C)\ \text{Cos}[c+d x]^{3/2}\ \text{Sin}[c+d x]}{105 d}+$$
$$\frac{2 C\,\text{Cos}[c+d x]^{3/2}\ (a+a\,\text{Cos}[c+d x])^2\ \text{Sin}[c+d x]}{9 d}+\frac{2 (9 B+4 C)\ \text{Cos}[c+d x]^{3/2}\left(a^2+a^2\,\text{Cos}[c+d x]\right)\text{Sin}[c+d x]}{63 d}$$

Result (type 5, 1322 leaves):

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^2\ \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\left(-\frac{(12 A+9 B+8 C)\ \text{Cot}[c]}{15 d}+\frac{(56 A+51 B+46 C)\ \text{Cos}[d x]\ \text{Sin}[c]}{168 d}+\right.$$
$$\frac{(18 A+36 B+37 C)\ \text{Cos}[2 d x]\ \text{Sin}[2 c]}{360 d}+\frac{(B+2 C)\ \text{Cos}[3 d x]\ \text{Sin}[3 c]}{56 d}+\frac{C\,\text{Cos}[4 d x]\ \text{Sin}[4 c]}{144 d}+\frac{(56 A+51 B+46 C)\ \text{Cos}[c]\ \text{Sin}[d x]}{168 d}+$$

$$\frac{(18\,A+36\,B+37\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{360\,d}+\frac{(B+2\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{56\,d}+\frac{C\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{144\,d}\Bigg)-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]$$

$$\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{7\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]$$

$$\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{5\,d}2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4$$

$$\Bigg(\Bigg(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Bigg)\Big/$$

$$\Bigg(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\Bigg)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)-\frac{1}{10\,d}3\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{15\,d}4\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 441: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 179 leaves, 7 steps) :

$$\frac{4 a^2 (5 A+4 B+3 C) \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{5 d}+$$

$$\frac{4 a^2 (14 A+7 B+6 C) \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]}{21 d}+\frac{2 a^2 (35 A+49 B+33 C) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{105 d}+$$

$$\frac{2 C \sqrt{\text{Cos}[c+d x]} (a+a \text{Cos}[c+d x])^2 \text{Sin}[c+d x]}{7 d}+\frac{2 (7 B+4 C) \sqrt{\text{Cos}[c+d x]} \left(a^2+a^2 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{35 d}$$

Result (type 5, 1270 leaves):

$$\sqrt{\text{Cos}[c+d x]} (a+a \text{Cos}[c+d x])^2 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(-\frac{(5 A+4 B+3 C) \text{Cot}[c]}{5 d}+\frac{(28 A+56 B+51 C) \text{Cos}[d x] \text{Sin}[c]}{168 d}+\frac{(B+2 C) \text{Cos}[2 d x] \text{Sin}[2 c]}{20 d}+\frac{C \text{Cos}[3 d x] \text{Sin}[3 c]}{56 d}+\right.$$

$$\left.\frac{(28 A+56 B+51 C) \text{Cos}[c] \text{Sin}[d x]}{168 d}+\frac{(B+2 C) \text{Cos}[2 c] \text{Sin}[2 d x]}{20 d}+\frac{C \text{Cos}[3 c] \text{Sin}[3 d x]}{56 d}\right)-\frac{1}{3 d \sqrt{1+\text{Cot}[c]^2}}$$

$$2 A (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3 d \sqrt{1+\text{Cot}[c]^2}}$$

$$B (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{7 d \sqrt{1+\text{Cot}[c]^2}} 2 C (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2 d} A (a+a \text{Cos}[c+d x])^2 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2}, -\frac{1}{4}\right\}, \left\{\frac{3}{4}\right\}, \text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right] \text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]] \text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{5\,d}2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{10\,d}3\,C\,(a+a\,\text{Cos}[c+d\,x])^2\ \text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 442: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 172 leaves, 7 steps):

$$\frac{4\,a^2\,(5\,B+4\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^2\,(3\,A+2\,B+C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,d}-\frac{2\,a^2\,(15\,A-5\,B-7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{2\,(5\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 1039 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(-\frac{(-5\,A+10\,B+8\,C+5\,A\,\text{Cos}[2\,c]+10\,B\,\text{Cos}[2\,c]+8\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{20\,d}+\frac{(B+2\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{6\,d}+\frac{C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{20\,d}+\frac{(B+2\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{6\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{2\,d}+\frac{C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{20\,d}\right)-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d}B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{5\,d}2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 443: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 172 leaves, 7 steps) :

$$-\frac{4\,a^2\,(A-C)\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{d}+\frac{4\,a^2\,(2\,A+3\,B+2\,C)\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-$$

$$\frac{2\,a^2\,(5\,A+3\,B-C)\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,(4\,A+3\,B)\ \left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\ \text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 1025 leaves) :

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\left(-\frac{(-4\,A-B+2\,C+B\,\text{Cos}[2\,c]+2\,C\,\text{Cos}[2\,c])\ \text{Csc}[c]\ \text{Sec}[c]}{4\,d}+\frac{C\,\text{Cos}[d\,x]\ \text{Sin}[c]}{6\,d}+\right.$$

$$\left.\frac{C\,\text{Cos}[c]\ \text{Sin}[d\,x]}{6\,d}+\frac{A\,\text{Sec}[c]\ \text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{6\,d}+\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]\ (A\,\text{Sin}[c]+6\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x])}{6\,d}\right)-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{2\,d}A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\middle/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{2\,d}C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\middle/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 444: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\ \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 174 leaves, 7 steps) :

$$-\frac{4\,a^2\ (4\,A+5\,B)\ \text{EllipticE}\left[\frac{1}{2}\ (c+d\,x),\ 2\right]}{5\,d}+\frac{4\,a^2\ (A+2\,B+3\,C)\ \text{EllipticF}\left[\frac{1}{2}\ (c+d\,x),\ 2\right]}{3\,d}+$$

$$\frac{2\,a^2\ (17\,A+25\,B+15\,C)\ \text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\ (a+a\,\text{Cos}[c+d\,x])^2\ \text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\ (4\,A+5\,B)\ \left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\ \text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 5, 1041 leaves) :

$$\sqrt{\text{Cos}[c+d\,x]}\ \ (a+a\,\text{Cos}[c+d\,x])^2\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\ \left(-\frac{(-16\,A-20\,B-5\,C+5\,C\,\text{Cos}[2\,c])\ \text{Csc}[c]\ \text{Sec}[c]}{20\,d}+\right.$$

$$\frac{A\,\text{Sec}[c]\ \text{Sec}[c+d\,x]^3\ \text{Sin}[d\,x]}{10\,d}+\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]^2\ (3\,A\,\text{Sin}[c]+10\,A\,\text{Sin}[d\,x]+5\,B\,\text{Sin}[d\,x])}{30\,d}+$$

$$\left.\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]\ (10\,A\,\text{Sin}[c]+5\,B\,\text{Sin}[c]+24\,A\,\text{Sin}[d\,x]+30\,B\,\text{Sin}[d\,x]+15\,C\,\text{Sin}[d\,x])}{30\,d}\right)-\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$A\ (a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ -$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}2\,B\ (a+a\,\text{Cos}[c+d\,x])^2\ \text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\ \text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{d\sqrt{1+\text{Cot}[c]^2}}$$

$$C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{5\,d}2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 445: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\mathrm{Cos}[c+d\,x])^2\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 215 leaves, 8 steps) :

$$-\frac{4\,a^2\,(3\,A+4\,B+5\,C)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^2\,(6\,A+7\,B+14\,C)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}+\frac{2\,a^2\,(33\,A+49\,B+35\,C)\,\mathrm{Sin}[c+d\,x]}{105\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^2\,(3\,A+4\,B+5\,C)\,\mathrm{Sin}[c+d\,x]}{5\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sin}[c+d\,x]}{7\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}+\frac{2\,(4\,A+7\,B)\,\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)\,\mathrm{Sin}[c+d\,x]}{35\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}$$

Result (type 5, 1310 leaves) :

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\left(\frac{(3\,A+4\,B+5\,C)\,\mathrm{Csc}[c]\,\mathrm{Sec}[c]}{5\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Sin}[d\,x]}{14\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,(5\,A\,\mathrm{Sin}[c]+14\,A\,\mathrm{Sin}[d\,x]+7\,B\,\mathrm{Sin}[d\,x])}{70\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(42\,A\,\mathrm{Sin}[c]+21\,B\,\mathrm{Sin}[c]+60\,A\,\mathrm{Sin}[d\,x]+70\,B\,\mathrm{Sin}[d\,x]+35\,C\,\mathrm{Sin}[d\,x])}{210\,d}+\frac{1}{210\,d}\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(60\,A\,\mathrm{Sin}[c]+70\,B\,\mathrm{Sin}[c]+35\,C\,\mathrm{Sin}[c]+126\,A\,\mathrm{Sin}[d\,x]+168\,B\,\mathrm{Sin}[d\,x]+210\,C\,\mathrm{Sin}[d\,x])\right)-$$

$$\frac{1}{7\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-\frac{1}{3\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}$$

$$B\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-$$

$$\frac{1}{3\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}2\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}+\frac{1}{10\,d}3\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Csc}[c]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{5\,d}2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{2\,d}C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 446: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 251 leaves, 9 steps):

$$-\frac{4\,a^2\,(8\,A+9\,B+12\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{4\,a^2\,(5\,A+6\,B+7\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+$$
$$\frac{2\,a^2\,(19\,A+27\,B+21\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{4\,a^2\,(5\,A+6\,B+7\,C)\,\text{Sin}[c+d\,x]}{21\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^2\,(8\,A+9\,B+12\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{9\,d\,\text{Cos}[c+d\,x]^{9/2}}+\frac{2\,(4\,A+9\,B)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{63\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 5, 1364 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$
$$\left(\frac{(8\,A+9\,B+12\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{15\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^5\,\text{Sin}[d\,x]}{18\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,(7\,A\,\text{Sin}[c]+18\,A\,\text{Sin}[d\,x]+9\,B\,\text{Sin}[d\,x])}{126\,d}+\right.$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(90\,A\,\text{Sin}[c]+45\,B\,\text{Sin}[c]+112\,A\,\text{Sin}[d\,x]+126\,B\,\text{Sin}[d\,x]+63\,C\,\text{Sin}[d\,x])}{630\,d}+\frac{1}{105\,d}$$
$$\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(25\,A\,\text{Sin}[c]+30\,B\,\text{Sin}[c]+35\,C\,\text{Sin}[c]+56\,A\,\text{Sin}[d\,x]+63\,B\,\text{Sin}[d\,x]+84\,C\,\text{Sin}[d\,x])+\frac{1}{630\,d}$$
$$\left.\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(112\,A\,\text{Sin}[c]+126\,B\,\text{Sin}[c]+63\,C\,\text{Sin}[c]+150\,A\,\text{Sin}[d\,x]+180\,B\,\text{Sin}[d\,x]+210\,C\,\text{Sin}[d\,x])\right)-$$
$$\frac{1}{21\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{7\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$2\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{3\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,+\frac{1}{15\,d}4\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4$$

$$\left(\left(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{10\,d}3\,B\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4$$

$$\left(\left(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{5\,d}2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 447: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 303 leaves, 10 steps):

$$\frac{4\,a^3\,(221\,A+195\,B+175\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{195\,d}+\frac{4\,a^3\,(121\,A+105\,B+95\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{231\,d}+$$
$$\frac{4\,a^3\,(121\,A+105\,B+95\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{231\,d}+\frac{4\,a^3\,(221\,A+195\,B+175\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{585\,d}+$$
$$\frac{20\,a^3\,(286\,A+273\,B+236\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{9009\,d}+\frac{2\,C\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{13\,d}+$$
$$\frac{2\,(13\,B+6\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{143\,a\,d}+\frac{2\,(143\,A+195\,B+145\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{1287\,d}$$

Result (type 5, 1426 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(-\frac{(221\,A+195\,B+175\,C)\,\text{Cot}[c]}{390\,d}+\frac{(2134\,A+1953\,B+1811\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{7392\,d}+\frac{(7592\,A+7800\,B+7825\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{74\,880\,d}+\right.$$
$$\frac{(132\,A+189\,B+215\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{4928\,d}+\frac{(13\,A+39\,B+59\,C)\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{3744\,d}+\frac{(B+3\,C)\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{704\,d}+$$
$$\frac{C\,\text{Cos}[6\,d\,x]\,\text{Sin}[6\,c]}{1664\,d}+\frac{(2134\,A+1953\,B+1811\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{7392\,d}+\frac{(7592\,A+7800\,B+7825\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{74\,880\,d}+$$
$$\left.\frac{(132\,A+189\,B+215\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{4928\,d}+\frac{(13\,A+39\,B+59\,C)\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{3744\,d}+\frac{(B+3\,C)\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{704\,d}+\frac{C\,\text{Cos}[6\,c]\,\text{Sin}[6\,d\,x]}{1664\,d}\right)-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}11\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{22\,d\,\sqrt{1+\text{Cot}[c]^2}}$$
$$5\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$
$$\frac{1}{462\,d\,\sqrt{1+\text{Cot}[c]^2}}95\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{60\,d}17\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$
$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$
$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)-\frac{1}{4\,d}B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\Bigg(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{156\,d}35\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 448: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\ \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 267 leaves, 9 steps):

$$\frac{4\,a^3\,(21\,A+17\,B+15\,C)\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{15\,d}+\frac{4\,a^3\,(143\,A+121\,B+105\,C)\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{231\,d}+$$
$$\frac{4\,a^3\,(143\,A+121\,B+105\,C)\ \sqrt{\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{231\,d}+\frac{4\,a^3\,(264\,A+253\,B+210\,C)\ \text{Cos}[c+d\,x]^{3/2}\ \text{Sin}[c+d\,x]}{1155\,d}+$$
$$\frac{2\,C\,\text{Cos}[c+d\,x]^{3/2}\ (a+a\,\text{Cos}[c+d\,x])^3\ \text{Sin}[c+d\,x]}{11\,d}+\frac{2\,(11\,B+6\,C)\ \text{Cos}[c+d\,x]^{3/2}\ \left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\ \text{Sin}[c+d\,x]}{99\,a\,d}+$$
$$\frac{2\,(99\,A+143\,B+105\,C)\ \text{Cos}[c+d\,x]^{3/2}\ \left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\ \text{Sin}[c+d\,x]}{693\,d}$$

Result (type 5, 1374 leaves):

$$\sqrt{\text{Cos}[c+d x]}\ (a+a\,\text{Cos}[c+d x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(-\frac{(21 A+17 B+15 C)\,\text{Cot}[c]}{30 d}+\frac{(2354 A+2134 B+1953 C)\,\text{Cos}[d x]\,\text{Sin}[c]}{7392 d}+\frac{(54 A+73 B+75 C)\,\text{Cos}[2 d x]\,\text{Sin}[2 c]}{720 d}+\right.$$

$$\frac{(44 A+132 B+189 C)\,\text{Cos}[3 d x]\,\text{Sin}[3 c]}{4928 d}+\frac{(B+3 C)\,\text{Cos}[4 d x]\,\text{Sin}[4 c]}{288 d}+\frac{C\,\text{Cos}[5 d x]\,\text{Sin}[5 c]}{704 d}+\frac{(2354 A+2134 B+1953 C)\,\text{Cos}[c]\,\text{Sin}[d x]}{7392 d}+$$

$$\left.\frac{(54 A+73 B+75 C)\,\text{Cos}[2 c]\,\text{Sin}[2 d x]}{720 d}+\frac{(44 A+132 B+189 C)\,\text{Cos}[3 c]\,\text{Sin}[3 d x]}{4928 d}+\frac{(B+3 C)\,\text{Cos}[4 c]\,\text{Sin}[4 d x]}{288 d}+\frac{C\,\text{Cos}[5 c]\,\text{Sin}[5 d x]}{704 d}\right)-$$

$$\frac{1}{42 d\sqrt{1+\text{Cot}[c]^2}}13 A\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{42 d\sqrt{1+\text{Cot}[c]^2}}$$

$$11 B\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{22 d\sqrt{1+\text{Cot}[c]^2}}5 C\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\,\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{20 d}7 A\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{60\,d}17\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{4\,d}C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)\right)$$

- **Problem 449: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 231 leaves, 8 steps) :

$$\frac{4 a^3 (27 A + 21 B + 17 C) \text{EllipticE}\left[\frac{1}{2} (c + d x), 2\right]}{15 d} + \frac{4 a^3 (21 A + 13 B + 11 C) \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right]}{21 d} + \frac{4 a^3 (42 A + 41 B + 32 C) \sqrt{\text{Cos}[c + d x]} \text{Sin}[c + d x]}{105 d} + \frac{2 C \sqrt{\text{Cos}[c + d x]} (a + a \text{Cos}[c + d x])^3 \text{Sin}[c + d x]}{9 d} + \frac{2 (3 B + 2 C) \sqrt{\text{Cos}[c + d x]} \left(a^2 + a^2 \text{Cos}[c + d x]\right)^2 \text{Sin}[c + d x]}{21 a d} + \frac{2 (63 A + 99 B + 73 C) \sqrt{\text{Cos}[c + d x]} \left(a^3 + a^3 \text{Cos}[c + d x]\right) \text{Sin}[c + d x]}{315 d}$$

Result (type 5, 1322 leaves):

$$\sqrt{\text{Cos}[c + d x]} (a + a \text{Cos}[c + d x])^3 \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \left(-\frac{(27 A + 21 B + 17 C) \text{Cot}[c]}{30 d} + \frac{(84 A + 107 B + 97 C) \text{Cos}[d x] \text{Sin}[c]}{336 d} + \frac{(18 A + 54 B + 73 C) \text{Cos}[2 d x] \text{Sin}[2 c]}{720 d} + \frac{(B + 3 C) \text{Cos}[3 d x] \text{Sin}[3 c]}{112 d} + \frac{C \text{Cos}[4 d x] \text{Sin}[4 c]}{288 d} + \frac{(84 A + 107 B + 97 C) \text{Cos}[c] \text{Sin}[d x]}{336 d} + \frac{(18 A + 54 B + 73 C) \text{Cos}[2 c] \text{Sin}[2 d x]}{720 d} + \frac{(B + 3 C) \text{Cos}[3 c] \text{Sin}[3 d x]}{112 d} + \frac{C \text{Cos}[4 c] \text{Sin}[4 d x]}{288 d}\right) - \frac{1}{2 d \sqrt{1 + \text{Cot}[c]^2}}$$

$$A (a + a \text{Cos}[c + d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]] \sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1 + \text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} - \frac{1}{42 d \sqrt{1 + \text{Cot}[c]^2}} 13 B (a + a \text{Cos}[c + d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]] \sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1 + \text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} - \frac{1}{42 d \sqrt{1 + \text{Cot}[c]^2}}$$

$$11 C (a + a \text{Cos}[c + d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]] \sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1 + \text{Cot}[c]^2} \text{Sin}[c] \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} - \frac{1}{20 d} 9 A (a + a \text{Cos}[c + d x])^3 \text{Csc}[c] \text{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{20\,d}7\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{60\,d}17\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 450: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 229 leaves, 8 steps):

$$\frac{4\,a^3\,(5\,A+9\,B+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{5\,d}+\frac{4\,a^3\,(35\,A+21\,B+13\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{21\,d}-\frac{4\,a^3\,(35\,A-42\,B-41\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{2\,(7\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{7\,a\,d}-\frac{2\,(35\,A-7\,B-11\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{35\,d}$$

Result (type 5, 1313 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(5\,A+18\,B+14\,C+15\,A\,\text{Cos}[2\,c]+18\,B\,\text{Cos}[2\,c]+14\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{40\,d}+\frac{(28\,A+84\,B+107\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{336\,d}+\frac{(B+3\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{40\,d}+\frac{C\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{112\,d}+\frac{(28\,A+84\,B+107\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{336\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\text{Sin}[d\,x]}{4\,d}+\frac{(B+3\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{40\,d}+\frac{C\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{112\,d}\right)-\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$5\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}13\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{4\,d}A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{20\,d}9\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{20\,d}7\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 451: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 227 leaves, 8 steps):

$$-\frac{4\,a^3\,(5\,A-5\,B-9\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(5\,A+5\,B+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-$$
$$\frac{4\,a^3\,(20\,A+5\,B-6\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+$$
$$\frac{2\,(2\,A+B)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{2\,(35\,A+15\,B-3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{15\,d}$$

Result (type 5, 1297 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(-25\,A+5\,B+18\,C+5\,A\,\text{Cos}[2\,c]+15\,B\,\text{Cos}[2\,c]+18\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{40\,d}+\right.$$
$$\frac{(B+3\,C)\,\text{Cos}[d\,x]\,\text{Sin}[c]}{12\,d}+\frac{C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{40\,d}+\frac{(B+3\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{12\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{12\,d}+$$
$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]+9\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x])}{12\,d}+\frac{C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{40\,d}\right)-\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$5\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$5\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{4\,d}A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Big(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\Big)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)-\frac{1}{4\,d}B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Big(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\Big)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{20\,d}9\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 452: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 230 leaves, 8 steps):

$$-\frac{4\,a^3\,(9\,A+5\,B-5\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(3\,A+5\,(B+C))\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,d}-$$
$$\frac{4\,a^3\,(21\,A+20\,B+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+$$
$$\frac{2\,(6\,A+5\,B)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{15\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,(33\,A+35\,B+15\,C)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 5, 1298 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(-\frac{(-36\,A-25\,B+5\,C+5\,B\,\text{Cos}[2\,c]+15\,C\,\text{Cos}[2\,c])\,\text{Csc}[c]\,\text{Sec}[c]}{40\,d}+\frac{C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{12\,d}+\frac{C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{12\,d}+\right.$$
$$\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,\text{Sin}[d\,x]}{20\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(3\,A\,\text{Sin}[c]+15\,A\,\text{Sin}[d\,x]+5\,B\,\text{Sin}[d\,x])}{60\,d}+$$

$$\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(15\,A\,\mathrm{Sin}[c]+5\,B\,\mathrm{Sin}[c]+54\,A\,\mathrm{Sin}[d\,x]+45\,B\,\mathrm{Sin}[d\,x]+15\,C\,\mathrm{Sin}[d\,x])}{60\,d}\Bigg)-\frac{1}{2\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}$$

$$A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\,\frac{1}{2}\Big\},\,\Big\{\frac{5}{4}\Big\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-\frac{1}{6\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}$$

$$5\,B\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\,\frac{1}{2}\Big\},\,\Big\{\frac{5}{4}\Big\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}-$$

$$\frac{1}{6\,d\,\sqrt{1+\mathrm{Cot}[c]^2}}5\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\,\frac{1}{2}\Big\},\,\Big\{\frac{5}{4}\Big\},\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\Big]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\,\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\,\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}+\frac{1}{20\,d}9\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Bigg(\mathrm{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},\,-\frac{1}{4}\Big\},\,\Big\{\frac{3}{4}\Big\},\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\Big]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\Bigg)\Big/$$

$$\Bigg(\sqrt{1-\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{1+\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]}\,\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}\,\sqrt{1+\mathrm{Tan}[c]^2}\Bigg)-$$

$$\frac{\frac{\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]}{\sqrt{1+\mathrm{Tan}[c]^2}}+\frac{2\,\mathrm{Cos}[c]^2\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}{\mathrm{Cos}[c]^2+\mathrm{Sin}[c]^2}}{\sqrt{\mathrm{Cos}[c]\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\sqrt{1+\mathrm{Tan}[c]^2}}}\Bigg)+\frac{1}{4\,d}B\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\,\mathrm{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Bigg(\mathrm{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},\,-\frac{1}{4}\Big\},\,\Big\{\frac{3}{4}\Big\},\,\mathrm{Cos}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]^2\Big]\,\mathrm{Sin}[d\,x+\mathrm{ArcTan}[\mathrm{Tan}[c]]]\,\mathrm{Tan}[c]\Bigg)\Big/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)-\frac{1}{4\,d}C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\ \text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 453: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 231 leaves, 8 steps) :

$$-\frac{4\,a^3\,(7\,A+9\,B+5\,C)\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,d}+\frac{4\,a^3\,(13\,A+21\,B+35\,C)\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,d}+\frac{4\,a^3\,(106\,A+147\,B+140\,C)\ \text{Sin}[c+d\,x]}{105\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,(6\,A+7\,B)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{35\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,(7\,A+9\,B+5\,C)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 5, 1317 leaves) :

$$\sqrt{\text{Cos}[c+d\,x]}\ (a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\left(-\frac{(-28\,A-36\,B-25\,C+5\,C\,\text{Cos}[2\,c])\ \text{Csc}[c]\ \text{Sec}[c]}{40\,d}+\right.$$

$$\frac{A\,\text{Sec}[c]\ \text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{28\,d}+\frac{\text{Sec}[c]\ \text{Sec}[c+d\,x]^3\,(5\,A\,\text{Sin}[c]+21\,A\,\text{Sin}[d\,x]+7\,B\,\text{Sin}[d\,x])}{140\,d}+$$

$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(63\,A\,\text{Sin}[c]+21\,B\,\text{Sin}[c]+130\,A\,\text{Sin}[d\,x]+105\,B\,\text{Sin}[d\,x]+35\,C\,\text{Sin}[d\,x])}{420\,d}+\frac{1}{420\,d}$$

$$\left.\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(130\,A\,\text{Sin}[c]+105\,B\,\text{Sin}[c]+35\,C\,\text{Sin}[c]+294\,A\,\text{Sin}[d\,x]+378\,B\,\text{Sin}[d\,x]+315\,C\,\text{Sin}[d\,x])\right)-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}13\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{2\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{6\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{20\,d}7\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}9\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{4\,d}C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 454: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 267 leaves, 9 steps) :

$$-\frac{4 a^3 (17 A+21 B+27 C) \text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{15 d}+\frac{4 a^3 (11 A+13 B+21 C) \text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{21 d}+$$
$$\frac{4 a^3 (32 A+41 B+42 C) \text{Sin}[c+d x]}{105 d \text{Cos}[c+d x]^{3/2}}+\frac{4 a^3 (17 A+21 B+27 C) \text{Sin}[c+d x]}{15 d \sqrt{\text{Cos}[c+d x]}}+\frac{2 A (a+a \text{Cos}[c+d x])^3 \text{Sin}[c+d x]}{9 d \text{Cos}[c+d x]^{9/2}}+$$
$$\frac{2 (2 A+3 B)\left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Sin}[c+d x]}{21 a d \text{Cos}[c+d x]^{7/2}}+\frac{2 (73 A+99 B+63 C)\left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{315 d \text{Cos}[c+d x]^{5/2}}$$

Result (type 5, 1364 leaves):

$$\sqrt{\text{Cos}[c+d x]}\,(a+a \text{Cos}[c+d x])^3 \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$
$$\left(\frac{(17 A+21 B+27 C) \text{Csc}[c] \text{Sec}[c]}{30 d}+\frac{A \text{Sec}[c] \text{Sec}[c+d x]^5 \text{Sin}[d x]}{36 d}+\frac{\text{Sec}[c] \text{Sec}[c+d x]^4 (7 A \text{Sin}[c]+27 A \text{Sin}[d x]+9 B \text{Sin}[d x])}{252 d}+\right.$$
$$\frac{\text{Sec}[c] \text{Sec}[c+d x]^3 (135 A \text{Sin}[c]+45 B \text{Sin}[c]+238 A \text{Sin}[d x]+189 B \text{Sin}[d x]+63 C \text{Sin}[d x])}{1260 d}+\frac{1}{1260 d}$$
$$\text{Sec}[c] \text{Sec}[c+d x]^2 (238 A \text{Sin}[c]+189 B \text{Sin}[c]+63 C \text{Sin}[c]+330 A \text{Sin}[d x]+390 B \text{Sin}[d x]+315 C \text{Sin}[d x])+\frac{1}{420 d}$$
$$\left.\text{Sec}[c] \text{Sec}[c+d x] (110 A \text{Sin}[c]+130 B \text{Sin}[c]+105 C \text{Sin}[c]+238 A \text{Sin}[d x]+294 B \text{Sin}[d x]+378 C \text{Sin}[d x])\right)-$$
$$\frac{1}{42 d \sqrt{1+\text{Cot}[c]^2}} 11 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{42 d \sqrt{1+\text{Cot}[c]^2}}$$
$$13 B (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}-$$
$$\frac{1}{2 d \sqrt{1+\text{Cot}[c]^2}} C (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$
$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]] \sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c] \text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{60 d} 17 A (a+a \text{Cos}[c+d x])^3 \text{Csc}[c] \text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}7\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}9\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\Big/\right.$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\Bigg)$$

- **Problem 455: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 4, 303 leaves, 10 steps):

$$-\frac{4\,a^3\,(15\,A+17\,B+21\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{15\,d}+\frac{4\,a^3\,(105\,A+121\,B+143\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{231\,d}+$$
$$\frac{4\,a^3\,(210\,A+253\,B+264\,C)\,\text{Sin}[c+d\,x]}{1155\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{4\,a^3\,(105\,A+121\,B+143\,C)\,\text{Sin}[c+d\,x]}{231\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{4\,a^3\,(15\,A+17\,B+21\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{11\,d\,\text{Cos}[c+d\,x]^{11/2}}+\frac{2\,(6\,A+11\,B)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{99\,a\,d\,\text{Cos}[c+d\,x]^{9/2}}+\frac{2\,(105\,A+143\,B+99\,C)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{693\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 5, 1418 leaves):

$$\sqrt{\text{Cos}[c+d\,x]}\,\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\left(\frac{(15\,A+17\,B+21\,C)\,\text{Csc}[c]\,\text{Sec}[c]}{30\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^6\,\text{Sin}[d\,x]}{44\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^5\,(9\,A\,\text{Sin}[c]+33\,A\,\text{Sin}[d\,x]+11\,B\,\text{Sin}[d\,x])}{396\,d}+\right.$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,(231\,A\,\text{Sin}[c]+77\,B\,\text{Sin}[c]+378\,A\,\text{Sin}[d\,x]+297\,B\,\text{Sin}[d\,x]+99\,C\,\text{Sin}[d\,x])}{2772\,d}+\frac{1}{2310\,d}$$
$$\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(525\,A\,\text{Sin}[c]+605\,B\,\text{Sin}[c]+715\,C\,\text{Sin}[c]+1155\,A\,\text{Sin}[d\,x]+1309\,B\,\text{Sin}[d\,x]+1617\,C\,\text{Sin}[d\,x])+\frac{1}{13\,860\,d}$$
$$\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(1890\,A\,\text{Sin}[c]+1485\,B\,\text{Sin}[c]+495\,C\,\text{Sin}[c]+2310\,A\,\text{Sin}[d\,x]+2618\,B\,\text{Sin}[d\,x]+2079\,C\,\text{Sin}[d\,x])+\frac{1}{13\,860\,d}$$
$$\left.\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(2310\,A\,\text{Sin}[c]+2618\,B\,\text{Sin}[c]+2079\,C\,\text{Sin}[c]+3150\,A\,\text{Sin}[d\,x]+3630\,B\,\text{Sin}[d\,x]+4290\,C\,\text{Sin}[d\,x])\right)-$$
$$\frac{1}{22\,d\,\sqrt{1+\text{Cot}[c]^2}}5\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}$$

$$11\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}-$$

$$\frac{1}{42\,d\,\sqrt{1+\text{Cot}[c]^2}}13\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]$$

$$\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\ \sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\ \sqrt{-\sqrt{1+\text{Cot}[c]^2}\ \text{Sin}[c]\ \text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}+\frac{1}{4\,d}A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Big(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\Big)-$$

$$\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}}\Bigg)+\frac{1}{60\,d}17\,B\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^6$$

$$\Bigg(\Big(\text{HypergeometricPFQ}\Big[\Big\{-\frac{1}{2},-\frac{1}{4}\Big\},\Big\{\frac{3}{4}\Big\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\Big]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\Big)\Big/$$

$$\Big(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\ \sqrt{\text{Cos}[c]\ \text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\ \sqrt{1+\text{Tan}[c]^2}}\ \sqrt{1+\text{Tan}[c]^2}\Big)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)+\frac{1}{20\,d}7\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\left(\left(\text{HypergeometricPFQ}\left[\left\{-\frac{1}{2},-\frac{1}{4}\right\},\left\{\frac{3}{4}\right\},\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]^2\right]\,\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]\right)\right/$$

$$\left(\sqrt{1-\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{1+\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]}\,\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}\,\sqrt{1+\text{Tan}[c]^2}\right)-$$

$$\left.\frac{\frac{\text{Sin}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\text{Tan}[c]}{\sqrt{1+\text{Tan}[c]^2}}+\frac{2\,\text{Cos}[c]^2\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}{\text{Cos}[c]^2+\text{Sin}[c]^2}}{\sqrt{\text{Cos}[c]\,\text{Cos}[d\,x+\text{ArcTan}[\text{Tan}[c]]]\,\sqrt{1+\text{Tan}[c]^2}}}\right)$$

- **Problem 456: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 210 leaves, 7 steps):

$$-\frac{3\,(5\,A-7\,B+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a\,d}+\frac{5\,(7\,A-7\,B+9\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{21\,a\,d}+\frac{5\,(7\,A-7\,B+9\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,a\,d}-$$
$$\frac{(5\,A-7\,B+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}+\frac{(7\,A-7\,B+9\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{7\,a\,d}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1752 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{20 (a+a \operatorname{Cos}[c+d x])} 21 i B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]\Bigg(\Bigg(\Bigg(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right]$$

$$\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/$$

$$\left(3 i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-\Bigg(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right]$$

$$\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/$$

$$\left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-\frac{1}{20 (a+a \operatorname{Cos}[c+d x])} 21 i C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3 i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\Bigg(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)+\frac{1}{a+a \operatorname{Cos}[c+d x]}$$

$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sqrt{\operatorname{Cos}[c+d x]}\left(\frac{2 (5 A-5 B+5 C+10 A \operatorname{Cos}[c]-16 B \operatorname{Cos}[c]+16 C \operatorname{Cos}[c]) \operatorname{Csc}[c]}{5 d}+\frac{(28 A-28 B+51 C) \operatorname{Cos}[d x] \operatorname{Sin}[c]}{21 d}+\right.$$

$$\frac{2 (B-C) \operatorname{Cos}[2 d x] \operatorname{Sin}[2 c]}{5 d}+\frac{C \operatorname{Cos}[3 d x] \operatorname{Sin}[3 c]}{7 d}+\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A \operatorname{Sin}\left[\frac{d x}{2}\right]-B \operatorname{Sin}\left[\frac{d x}{2}\right]+C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{d}+$$

$$\left.\frac{(28 A-28 B+51 C) \operatorname{Cos}[c] \operatorname{Sin}[d x]}{21 d}+\frac{2 (B-C) \operatorname{Cos}[2 c] \operatorname{Sin}[2 d x]}{5 d}+\frac{C \operatorname{Cos}[3 c] \operatorname{Sin}[3 d x]}{7 d}\right)-$$

$$\Bigg(5 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/\left(3 d (a+a \operatorname{Cos}[c+d x]) \sqrt{1+\operatorname{Cot}[c]^2}\right)+$$

$$\left(5\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\right.$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(15\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\right.$$
$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(7\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 457: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 174 leaves, 6 steps):

$$\frac{3\,(5\,A-5\,B+7\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a\,d}-\frac{(3\,A-5\,B+5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}-$$
$$\frac{(3\,A-5\,B+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d}+\frac{(5\,A-5\,B+7\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1697 leaves):

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}3\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$

$$\operatorname{Csc}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i\,e^{2 i d x}\operatorname{Sin}[2 c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i\,e^{2 i d x}\operatorname{Sin}[2 c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)\right)+\frac{1}{20\,(a+a\operatorname{Cos}[c+d x])}21\,i\,C\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2$$

$$\operatorname{Csc}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i\,e^{2 i d x}\operatorname{Sin}[2 c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\operatorname{Cos}[c]+i\operatorname{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\operatorname{Cos}[2 c]+i\,e^{2 i d x}\operatorname{Sin}[2 c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right)\operatorname{Sin}[c]\right)\right)+\frac{1}{a+a\operatorname{Cos}[c+d x]}$$

$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\operatorname{Cos}[c+d x]}\left(-\frac{2\,(5 A-5 B+5 C+10 A\operatorname{Cos}[c]-10 B\operatorname{Cos}[c]+16 C\operatorname{Cos}[c])\operatorname{Csc}[c]}{5 d}+\frac{4\,(B-C)\operatorname{Cos}[d x]\operatorname{Sin}[c]}{3 d}+\right.$$

$$\left.\frac{2 C\operatorname{Cos}[2 d x]\operatorname{Sin}[2 c]}{5 d}-\frac{2\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\operatorname{Sin}\left[\frac{d x}{2}\right]-B\operatorname{Sin}\left[\frac{d x}{2}\right]+C\operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\frac{4\,(B-C)\operatorname{Cos}[c]\operatorname{Sin}[d x]}{3 d}+\frac{2 C\operatorname{Cos}[2 c]\operatorname{Sin}[2 d x]}{5 d}\right)+$$

$$\left(A\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\operatorname{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\right.$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\sqrt{-\sqrt{1+\operatorname{Cot}[c]^2}\operatorname{Sin}[c]\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\left.\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right)\Big/\left(d\,(a+a\operatorname{Cos}[c+d x])\sqrt{1+\operatorname{Cot}[c]^2}\right)-$$

$$\left(5 B\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\operatorname{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right]\operatorname{Sec}\left[\frac{c}{2}\right]\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\sqrt{-\sqrt{1+\operatorname{Cot}[c]^2}\operatorname{Sin}[c]\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+\Bigg(5\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]$$

$$\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\Bigg)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 458: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 134 leaves, 5 steps):

$$-\frac{(A-3\,B+3\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{(3\,A-3\,B+5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+$$

$$\frac{(3\,A-3\,B+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1644 leaves):

$$-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,3\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\Bigg(\Bigg(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]$$

$$\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\Bigg)\Big/$$

$$\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-\Bigg(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]$$

$$\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/$$

$$\left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-\frac{1}{4(a+a \operatorname{Cos}[c+d x])} 3 i C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2 e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/\left(3 i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3 d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\Bigg(2 \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4},-e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/\left(-i d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{a+a \operatorname{Cos}[c+d x]} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \sqrt{\operatorname{Cos}[c+d x]}\left(-\frac{2(-A+B-C+2 B \operatorname{Cos}[c]-2 C \operatorname{Cos}[c]) \operatorname{Csc}[c]}{d}+\frac{4 C \operatorname{Cos}[d x] \operatorname{Sin}[c]}{3 d}+\right.$$

$$\left.\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A \operatorname{Sin}\left[\frac{d x}{2}\right]-B \operatorname{Sin}\left[\frac{d x}{2}\right]+C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\frac{4 C \operatorname{Cos}[c] \operatorname{Sin}[d x]}{3 d}\right)-$$

$$\Bigg(A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/\left(d(a+a \operatorname{Cos}[c+d x]) \sqrt{1+\operatorname{Cot}[c]^2}\right)+$$

$$\Bigg(B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/\left(d(a+a \operatorname{Cos}[c+d x]) \sqrt{1+\operatorname{Cot}[c]^2}\right)-$$

$$\Bigg(5 C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 459: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 90 leaves, 4 steps):

$$\frac{(A-B+3\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}+\frac{(A+B-C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}-\frac{(A-B+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1607 leaves):

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+\frac{1}{4\,(a+a\,\text{Cos}[c+d\,x])}\,3\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\text{Cos}[2 c]+i\,e^{2 i d x}\text{Sin}[2 c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)+$$

$$\frac{\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\text{Cos}[c+d x]}\left(-\frac{2(A-B+C+2\,C\,\text{Cos}[c])\,\text{Csc}[c]}{d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}\right)}{a+a\,\text{Cos}[c+d x]}-$$

$$\left(A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)+\left(C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$

$$\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 460: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])}\,dx$$

Optimal (type 4, 125 leaves, 5 steps):

$$-\frac{(3A-B+C)\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]}{a d}-\frac{(A-B-C)\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]}{a d}+\frac{(3A-B+C)\,\text{Sin}[c+d x]}{a d\sqrt{\text{Cos}[c+d x]}}-\frac{(A-B+C)\,\text{Sin}[c+d x]}{d\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])}$$

Result (type 5, 1642 leaves) :

$$-\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}3\,\mathrm{i}\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\Bigg(\Bigg(2\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(3\,\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)-$$
$$\Bigg(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(-\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)\Bigg)+$$
$$\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}\mathrm{i}\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\Bigg(\Bigg(2\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]$$
$$\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/$$
$$\left(3\,\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)-\Bigg(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]$$
$$\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/$$
$$\left(-\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)\Bigg)-\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}\mathrm{i}\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\Bigg(\Bigg(2\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(3\,\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)-$$
$$\Bigg(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}$$
$$\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg)\Big/\left(-\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)\Bigg)+$$
$$\frac{1}{a+a\,\mathrm{Cos}[c+d\,x]}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\left(\frac{(2\,A+A\,\mathrm{Cos}[c]-B\,\mathrm{Cos}[c]+C\,\mathrm{Cos}[c])\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[c]}{d}+\right.$$
$$\left.\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{d}\right)+$$

$$\left(A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]] \sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/ \left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\sqrt{1+\mathrm{Cot}[c]^2}\right) -$$

$$\left(B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]] \sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/ \left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\sqrt{1+\mathrm{Cot}[c]^2}\right) -$$

$$\left(C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]] \sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/ \left(d\,(a+a\,\mathrm{Cos}[c+d\,x])\sqrt{1+\mathrm{Cot}[c]^2}\right)$$

- **Problem 461: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 165 leaves, 6 steps):

$$\frac{(3\,A-3\,B+C)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a\,d}+\frac{(5\,A-3\,B+3\,C)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+\frac{(5\,A-3\,B+3\,C)\,\mathrm{Sin}[c+d\,x]}{3\,a\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}-\frac{(3\,A-3\,B+C)\,\mathrm{Sin}[c+d\,x]}{a\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{(A-B+C)\,\mathrm{Sin}[c+d\,x]}{d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 5, 1686 leaves):

$$\frac{1}{4\,(a+a\,\mathrm{Cos}[c+d\,x])}3\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\left(\text{Cos}[c]+i\,\text{Sin}[c]\right)^2\Big]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\Bigg)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\left(\text{Cos}[c]+i\,\text{Sin}[c]\right)^2\Big]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\Bigg)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-\frac{1}{4\left(a+a\,\text{Cos}[c+d x]\right)}3\,i\,B\,\text{Cos}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^2$$

$$\text{Csc}\Big[\frac{c}{2}\Big]\,\text{Sec}\Big[\frac{c}{2}\Big]\Bigg(\Bigg(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\left(\text{Cos}[c]+i\,\text{Sin}[c]\right)^2\Big]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\Bigg)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\left(\text{Cos}[c]+i\,\text{Sin}[c]\right)^2\Big]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\Bigg)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+\frac{1}{4\left(a+a\,\text{Cos}[c+d x]\right)}i\,C\,\text{Cos}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^2$$

$$\text{Csc}\Big[\frac{c}{2}\Big]\,\text{Sec}\Big[\frac{c}{2}\Big]\Bigg(\Bigg(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\Big[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\left(\text{Cos}[c]+i\,\text{Sin}[c]\right)^2\Big]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\Bigg)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\Bigg(2\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\left(\text{Cos}[c]+i\,\text{Sin}[c]\right)^2\Big]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\Bigg)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{a+a\,\text{Cos}[c+d x]}\text{Cos}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^2\sqrt{\text{Cos}[c+d x]}\Bigg(-\frac{\left(2A-2B+A\,\text{Cos}[c]-B\,\text{Cos}[c]+C\,\text{Cos}[c]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}-$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\frac{4\,A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{3\,d}+$$

$$\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d x]\left(A\,\text{Sin}[c]-3\,A\,\text{Sin}[d x]+3\,B\,\text{Sin}[d x]\right)}{3\,d}\Bigg)-$$

$$\Bigg(5\,A\,\text{Cos}\Big[\frac{c}{2}+\frac{d x}{2}\Big]^2\text{Csc}\Big[\frac{c}{2}\Big]\,\text{HypergeometricPFQ}\Big[\Big\{\frac{1}{4},\frac{1}{2}\Big\},\Big\{\frac{5}{4}\Big\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\Big]\,\text{Sec}\Big[\frac{c}{2}\Big]$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right) \Big/ \left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right) \Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)-\left(C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\right.$$

$$\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right) \Big/ \left(d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 462: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,(a+a\,\text{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 210 leaves, 7 steps):

$$-\frac{3\,(7\,A-5\,B+5\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{5\,a\,d}-\frac{(5\,A-5\,B+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a\,d}+$$
$$\frac{(7\,A-5\,B+5\,C)\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}-\frac{(5\,A-5\,B+3\,C)\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{3\,(7\,A-5\,B+5\,C)\,\text{Sin}[c+d\,x]}{5\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{d\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 1745 leaves):

$$-\frac{1}{20\,(a+a\,\text{Cos}[c+d\,x])}21\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\frac{1}{4\,(a+a\,\text{Cos}[c+d x])}3\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/$$

$$\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.$$

$$\left.\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/$$

$$\left.\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-\frac{1}{4\,(a+a\,\text{Cos}[c+d x])}3\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)+\frac{1}{a+a\,\text{Cos}[c+d x]}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\sqrt{\text{Cos}[c+d x]}\left(\frac{(16 A-10 B+10 C+5 A\,\text{Cos}[c]-5 B\,\text{Cos}[c]+5 C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{5 d}+\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\frac{4 A\,\text{Sec}[c]\,\text{Sec}[c+d x]^3\,\text{Sin}[d x]}{5 d}+$$

$$\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,(3 A\,\text{Sin}[c]-5 A\,\text{Sin}[d x]+5 B\,\text{Sin}[d x])}{15 d}-$$

$$\left.\frac{4\,\text{Sec}[c]\,\text{Sec}[c+d x]\,(5 A\,\text{Sin}[c]-5 B\,\text{Sin}[c]-24 A\,\text{Sin}[d x]+15 B\,\text{Sin}[d x]-15 C\,\text{Sin}[d x])}{15 d}\right)+$$

$$\left(5 A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(5\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\,\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{1+\text{Cot}[c]^2}\right)$$

- **Problem 463: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 214 leaves, 7 steps):

$$\frac{(20\,A-35\,B+56\,C)\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{5\,a^2\,d}-\frac{5\,(A-2\,B+3\,C)\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a^2\,d}-\frac{5\,(A-2\,B+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,d}+$$
$$\frac{(20\,A-35\,B+56\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a^2\,d}-\frac{(A-2\,B+3\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1789 leaves):

$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)-\frac{1}{2\,(a+a\,\text{Cos}[c+d x])^2}7\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+\frac{1}{5\,(a+a\,\text{Cos}[c+d x])^2}28\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3\,i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\Bigg)+$$

$$\left(10\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(20\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\;\sqrt{-\sqrt{1+\text{Cot}[c]^2}\;\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(10\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\sqrt{1+\mathrm{Cot}[c]^2}\right)+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(10\,A-15\,B+20\,C+10\,A\,\mathrm{Cos}[c]-20\,B\,\mathrm{Cos}[c]+36\,C\,\mathrm{Cos}[c])\,\mathrm{Csc}[c]}{5\,d}+\frac{8\,(B-2\,C)\,\mathrm{Cos}[d\,x]\,\mathrm{Sin}[c]}{3\,d}+\frac{4\,C\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{5\,d}+\right.$$

$$\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(2\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-3\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+4\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+$$

$$\left.\frac{8\,(B-2\,C)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{4\,C\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{5\,d}+\frac{2\,(A-B+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 464: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{3/2}\,(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2)}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 180 leaves, 6 steps):

$$-\frac{(A-4\,B+7\,C)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{a^2\,d}+\frac{(2\,A-5\,B+10\,C)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{3\,a^2\,d}+$$

$$\frac{(2\,A-5\,B+10\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d}-\frac{(A-4\,B+7\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A-B+C)\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 5, 1741 leaves):

$$-\frac{1}{2\,(a+a\,\mathrm{Cos}[c+d\,x])^2}\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-$$

$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)+$$

$$\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}2\,i\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/$$
$$\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/$$
$$\left.\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)\right)-\frac{1}{2\,(a+a\,\mathrm{Cos}[c+d\,x])^2}7\,i\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)-$$
$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)\right)-$$
$$\left(4\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$
$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\sqrt{1+\mathrm{Cot}[c]^2}\right)+$$
$$\left(10\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\right.$$
$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\,\mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$
$$\left.\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\sqrt{1+\mathrm{Cot}[c]^2}\right)-$$
$$\left(20\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(-A+2\,B-3\,C+2\,B\,\text{Cos}[c]-4\,C\,\text{Cos}[c])\,\text{Csc}[c]}{d}+\frac{8\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{3\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\left.\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-2\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+3\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\frac{8\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 465: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 139 leaves, 5 steps):

$$-\frac{(B-4\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a^2\,d}+\frac{(A+2\,B-5\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a^2\,d}+$$

$$\frac{(A+2\,B-5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1347 leaves):

$$-\frac{1}{2\,(a+a\,\text{Cos}[c+d\,x])^2}\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2c]+i\,e^{2 i d x}\,\text{Sin}[2c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$
$$\left(4\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$
$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+$$
$$\left(10\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$
$$\left(3\,d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\sqrt{\text{Cos}[c+d x]}$$
$$\left(-\frac{4\,(-B+2\,C+2\,C\,\text{Cos}[c])\,\text{Csc}[c]}{d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(B\,\text{Sin}\left[\frac{d x}{2}\right]-2\,C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}+\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{3\,d}+\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 466: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + B\,\text{Cos}[c + d\,x] + C\,\text{Cos}[c + d\,x]^2}{\sqrt{\text{Cos}[c + d\,x]}\,\left(a + a\,\text{Cos}[c + d\,x]\right)^2}\,dx$$

Optimal (type 4, 133 leaves, 5 steps):

$$\frac{(A - C)\,\text{EllipticE}\left[\frac{1}{2}\,(c + d\,x),\,2\right]}{a^2\,d} + \frac{(2\,A + B + 2\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c + d\,x),\,2\right]}{3\,a^2\,d} - \frac{(A - C)\,\sqrt{\text{Cos}[c + d\,x]}\,\text{Sin}[c + d\,x]}{a^2\,d\,(1 + \text{Cos}[c + d\,x])} - \frac{(A - B + C)\,\sqrt{\text{Cos}[c + d\,x]}\,\text{Sin}[c + d\,x]}{3\,d\,(a + a\,\text{Cos}[c + d\,x])^2}$$

Result (type 5, 1342 leaves):

$$\frac{1}{2\,(a + a\,\text{Cos}[c + d\,x])^2}\,i\,A\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] - 3\,d\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right) -$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + d\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right) - \frac{1}{2\,(a + a\,\text{Cos}[c + d\,x])^2}\,i\,C\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] - 3\,d\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right) -$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1 + e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + d\,\left(-1 + e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right) -$$
$$\left(4\,A\,\text{Cos}\left[\frac{c}{2} + \frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\,\frac{1}{2}\right\},\,\left\{\frac{5}{4}\right\},\,\text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]^2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}[d\,x - \text{ArcTan}[\text{Cot}[c]]]\right.$$
$$\sqrt{1 - \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1 + \text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}$$
$$\left.\sqrt{1 + \text{Sin}[d\,x - \text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a + a\,\text{Cos}[c + d\,x])^2\,\sqrt{1 + \text{Cot}[c]^2}\right) -$$

$$\left(2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(4\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d\,x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d\,x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(A-C)\,\text{Csc}[c]}{d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}-\right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

## ■ Problem 467: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 175 leaves, 6 steps):

$$-\frac{(4\,A-B)\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{a^2\,d}-\frac{(5\,A-2\,B-C)\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{3\,a^2\,d}+$$
$$\frac{(4\,A-B)\,\text{Sin}[c+d\,x]}{a^2\,d\sqrt{\text{Cos}[c+d\,x]}}-\frac{(5\,A-2\,B-C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\sqrt{\text{Cos}[c+d\,x]}\,(1+\text{Cos}[c+d\,x])}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{3\,d\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2}$$

Result (type 5, 1380 leaves):

$$-\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}2\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x} \mathrm{Cos}[2 c]+i\, e^{2 i d x} \mathrm{Sin}[2 c]}\right) \Big/ \left(3\, i\, d \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]-3\, d \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)-$$

$$\left(2\, \mathrm{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\mathrm{Cos}[c]+i\, \mathrm{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x} \mathrm{Cos}[2 c]+i\, e^{2 i d x} \mathrm{Sin}[2 c]}\right) \Big/ \left(-i\, d \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+d \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)\right)+\frac{1}{2\, (a+a\, \mathrm{Cos}[c+d x])^2} i\, B\, \mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4$$

$$\mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{Sec}\left[\frac{c}{2}\right] \left(\left(2\, e^{2 i d x}\, \mathrm{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\mathrm{Cos}[c]+i\, \mathrm{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x} \mathrm{Cos}[2 c]+i\, e^{2 i d x} \mathrm{Sin}[2 c]}\right) \Big/ \left(3\, i\, d \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]-3\, d \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)-$$

$$\left(2\, \mathrm{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\mathrm{Cos}[c]+i\, \mathrm{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+2\, i \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x} \mathrm{Cos}[2 c]+i\, e^{2 i d x} \mathrm{Sin}[2 c]}\right) \Big/ \left(-i\, d \left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+d \left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)\right)+$$

$$\left(10\, A\, \mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\sqrt{1-\mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\, \mathrm{Sin}[c]\, \mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{1+\mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/ \left(3\, d\, (a+a\, \mathrm{Cos}[c+d x])^2 \sqrt{1+\mathrm{Cot}[c]^2}\right)-$$

$$\left(4\, B\, \mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right]\right.$$

$$\mathrm{Sec}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]] \sqrt{1-\mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\, \mathrm{Sin}[c]\, \mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\left.\sqrt{1+\mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/ \left(3\, d\, (a+a\, \mathrm{Cos}[c+d x])^2 \sqrt{1+\mathrm{Cot}[c]^2}\right)-$$

$$\left(2\, C\, \mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\, \mathrm{Sin}[c]\, \mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]} \sqrt{1+\mathrm{Sin}[d x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\right) \Big/$$

$$\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\sqrt{1+\mathrm{Cot}[c]^2}\right)+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\left(\frac{2\,(2\,A+2\,A\,\mathrm{Cos}[c]-B\,\mathrm{Cos}[c])\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}[c]}{d}+\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(2\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{8\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{d}+\frac{2\,(A-B+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 468: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 211 leaves, 7 steps):

$$\frac{(7\,A-4\,B+C)\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a^2\,d}+\frac{(10\,A-5\,B+2\,C)\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{3\,a^2\,d}+\frac{(10\,A-5\,B+2\,C)\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}-$$

$$\frac{(7\,A-4\,B+C)\,\mathrm{Sin}[c+d\,x]}{a^2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{(7\,A-4\,B+C)\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A-B+C)\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 5, 1782 leaves):

$$\frac{1}{2\,(a+a\,\mathrm{Cos}[c+d\,x])^2}7\,i\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$

$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)\right)-\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}2\,i\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)-$$

$$\left(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\mathrm{Cos}[c]+i\,\mathrm{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\mathrm{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\mathrm{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)\right)+\frac{1}{2\,(a+a\,\mathrm{Cos}[c+d\,x])^2}i\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4$$

$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2 i d x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(3 i d\left(1+e^{2 i d x}\right)\text{Cos}[c]-3 d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)\right)-$$

$$\left(20\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3 d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(10\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3 d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(4\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3 d\,(a+a\,\text{Cos}[c+d x])^2\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^2}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\sqrt{\text{Cos}[c+d x]}$$

$$\left(-\frac{2\,(4 A-2 B+3 A\,\text{Cos}[c]-2 B\,\text{Cos}[c]+C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(3 A\,\text{Sin}\left[\frac{d x}{2}\right]-2 B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{d}-\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{8\,A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,\text{Sin}[d\,x]}{3\,d}+$$
$$\left.\frac{8\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,\left(A\,\text{Sin}[c]-6\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x]\right)}{3\,d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 469: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{7/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 273 leaves, 8 steps):

$$\frac{7\,(7\,A-17\,B+33\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{10\,a^3\,d}-\frac{(13\,A-33\,B+63\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{6\,a^3\,d}-$$
$$\frac{(13\,A-33\,B+63\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,a^3\,d}+\frac{7\,(7\,A-17\,B+33\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{30\,a^3\,d}-$$
$$\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(2\,A-7\,B+12\,C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(13\,A-33\,B+63\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1888 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}49\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}$$
$$119\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/$$
$$\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/$$

$$\left(-\mathbb{i}\, d \left(1+e^{2 \mathbb{i} d x}\right) \text{Cos}[c] + d \left(-1+e^{2 \mathbb{i} d x}\right) \text{Sin}[c]\right)\Bigg) + \frac{1}{10 \left(a + a \,\text{Cos}[c+d x]\right)^3} 231 \,\mathbb{i}\, C \,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2 e^{2 \mathbb{i} d x} \,\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 \mathbb{i} d x} \left(\text{Cos}[c] + \mathbb{i}\, \text{Sin}[c]\right)^2\right] \sqrt{e^{-\mathbb{i} d x} \left(2 \left(1+e^{2 \mathbb{i} d x}\right) \text{Cos}[c] + 2 \,\mathbb{i} \left(-1+e^{2 \mathbb{i} d x}\right) \text{Sin}[c]\right)}$$

$$\sqrt{1 + e^{2 \mathbb{i} d x} \,\text{Cos}[2 c] + \mathbb{i}\, e^{2 \mathbb{i} d x} \,\text{Sin}[2 c]}\Bigg) \Big/ \left(3 \,\mathbb{i}\, d \left(1+e^{2 \mathbb{i} d x}\right) \text{Cos}[c] - 3 d \left(-1+e^{2 \mathbb{i} d x}\right) \text{Sin}[c]\right) -$$

$$\Bigg(2 \,\text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 \mathbb{i} d x} \left(\text{Cos}[c] + \mathbb{i}\, \text{Sin}[c]\right)^2\right] \sqrt{e^{-\mathbb{i} d x} \left(2 \left(1+e^{2 \mathbb{i} d x}\right) \text{Cos}[c] + 2 \,\mathbb{i} \left(-1+e^{2 \mathbb{i} d x}\right) \text{Sin}[c]\right)}$$

$$\sqrt{1 + e^{2 \mathbb{i} d x} \,\text{Cos}[2 c] + \mathbb{i}\, e^{2 \mathbb{i} d x} \,\text{Sin}[2 c]}\Bigg) \Big/ \left(-\mathbb{i}\, d \left(1+e^{2 \mathbb{i} d x}\right) \text{Cos}[c] + d \left(-1+e^{2 \mathbb{i} d x}\right) \text{Sin}[c]\right)\Bigg) +$$

$$\Bigg(26 A \,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}\right] \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2}\, \text{Sin}[c] \,\text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}\Bigg) \Big/ \left(3 d \left(a + a \,\text{Cos}[c+d x]\right)^3 \sqrt{1+\text{Cot}[c]^2}\right) -$$

$$\Bigg(22 B \,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}\right]$$

$$\text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]] \sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2}\, \text{Sin}[c] \,\text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}$$

$$\sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}\Bigg) \Big/ \left(d \left(a + a \,\text{Cos}[c+d x]\right)^3 \sqrt{1+\text{Cot}[c]^2}\right) +$$

$$\Bigg(42 C \,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \text{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\}, \left\{\frac{5}{4}\right\}, \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]^2\right] \text{Sec}\left[\frac{c}{2}\right] \text{Sec}[d x - \text{ArcTan}[\text{Cot}[c]]]$$

$$\sqrt{1 - \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{-\sqrt{1+\text{Cot}[c]^2}\, \text{Sin}[c] \,\text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]} \sqrt{1 + \text{Sin}[d x - \text{ArcTan}[\text{Cot}[c]]]}\Bigg) \Big/$$

$$\left(d \left(a + a \,\text{Cos}[c+d x]\right)^3 \sqrt{1+\text{Cot}[c]^2}\right) + \frac{1}{\left(a + a \,\text{Cos}[c+d x]\right)^3} \text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\text{Cos}[c+d x]}$$

$$\Bigg(-\frac{4 \left(29 A - 59 B + 99 C + 20 A \,\text{Cos}[c] - 60 B \,\text{Cos}[c] + 132 C \,\text{Cos}[c]\right) \text{Csc}[c]}{5 d} + \frac{16 \left(B - 3 C\right) \text{Cos}[d x] \,\text{Sin}[c]}{3 d} + \frac{8 C \,\text{Cos}[2 d x] \,\text{Sin}[2 c]}{5 d} -$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(14\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-19\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+24\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}-$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(29\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-59\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+99\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{16\,(B-3\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}+$$

$$\left.\frac{8\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{5\,d}+\frac{4\,(14\,A-19\,B+24\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 470: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 232 leaves, 7 steps):

$$-\frac{(9\,A-49\,B+119\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{10\,a^3\,d}+\frac{(3\,A-13\,B+33\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{6\,a^3\,d}+\frac{(3\,A-13\,B+33\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,a^3\,d}-$$

$$\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{(B-2\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{3\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(9\,A-49\,B+119\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{30\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1841 leaves):

$$-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\bigg/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\bigg/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)+$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}49\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\bigg/$$

$$\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\bigg/$$

$$\left(-i\, d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-\frac{1}{10\,(a+a \operatorname{Cos}[c+d x])^3} 119\, i\, C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\, e^{2 i d x} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i\, e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(3\, i\, d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]-3\, d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)-$$

$$\Bigg(2 \text{ Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x}(\operatorname{Cos}[c]+i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+2 i\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)}$$

$$\sqrt{1+e^{2 i d x} \operatorname{Cos}[2 c]+i\, e^{2 i d x} \operatorname{Sin}[2 c]}\Bigg) \Big/ \left(-i\, d\left(1+e^{2 i d x}\right) \operatorname{Cos}[c]+d\left(-1+e^{2 i d x}\right) \operatorname{Sin}[c]\right)\Bigg)-$$

$$\Bigg(2\, A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/ \left(d\,(a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)+$$

$$\Bigg(26\, B \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]] \sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}$$

$$\sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/ \left(3\, d\,(a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)-$$

$$\Bigg(22\, C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \text{HypergeometricPFQ}\left[\left\{\frac{1}{4}, \frac{1}{2}\right\},\left\{\frac{5}{4}\right\}, \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]^2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]$$

$$\sqrt{1-\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{-\sqrt{1+\operatorname{Cot}[c]^2} \operatorname{Sin}[c] \operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]} \sqrt{1+\operatorname{Sin}[d x-\operatorname{ArcTan}[\operatorname{Cot}[c]]]}\Bigg) \Big/$$

$$\left(d\,(a+a \operatorname{Cos}[c+d x])^3 \sqrt{1+\operatorname{Cot}[c]^2}\right)+\frac{1}{(a+a \operatorname{Cos}[c+d x])^3} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c+d x]}$$

$$\left(-\frac{4\,(-9 A+29 B-59 C+20 B \operatorname{Cos}[c]-60 C \operatorname{Cos}[c]) \operatorname{Csc}[c]}{5 d}+\frac{16 C \operatorname{Cos}[d x] \operatorname{Sin}[c]}{3 d}+\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(9\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-14\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+19\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(9\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-29\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+59\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{16\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{3\,d}-$$

$$\left.\frac{4\,(9\,A-14\,B+19\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 471: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 195 leaves, 6 steps):

$$-\frac{(A+9\,B-49\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(A+3\,B-13\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}-$$

$$\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{(2\,A+3\,B-8\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{(A+3\,B-13\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1809 leaves):

$$-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$

$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-$$

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/$$

$$\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/$$

$$\left(-\mathrm{i}\, d \left(1+e^{2\,\mathrm{i}\,d\,x}\right) \mathrm{Cos}[c] + d \left(-1+e^{2\,\mathrm{i}\,d\,x}\right) \mathrm{Sin}[c]\right)\Bigg) + \frac{1}{10\,(a+a\,\mathrm{Cos}[c+d\,x])^3} 49\,\mathrm{i}\, C\, \mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\Bigg(\Bigg(2\,e^{2\,\mathrm{i}\,d\,x}\, \mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right] \sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg) \Big/ \left(3\,\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]-3\,d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right) -$$

$$\Bigg(2\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,d\,x}\,(\mathrm{Cos}[c]+\mathrm{i}\,\mathrm{Sin}[c])^2\right] \sqrt{e^{-\mathrm{i}\,d\,x}\left(2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}$$

$$\sqrt{1+e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Cos}[2\,c]+\mathrm{i}\,e^{2\,\mathrm{i}\,d\,x}\,\mathrm{Sin}[2\,c]}\Bigg) \Big/ \left(-\mathrm{i}\,d\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+d\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)\Bigg) -$$

$$\Bigg(2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\ \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\ \mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\Bigg) \Big/ \left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\sqrt{1+\mathrm{Cot}[c]^2}\right) -$$

$$\Bigg(2\,B\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right]$$

$$\mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]\ \sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\ \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\ \mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}$$

$$\sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\Bigg) \Big/ \left(d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\sqrt{1+\mathrm{Cot}[c]^2}\right) +$$

$$\Bigg(26\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 \mathrm{Csc}\left[\frac{c}{2}\right] \mathrm{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]^2\right] \mathrm{Sec}\left[\frac{c}{2}\right] \mathrm{Sec}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]$$

$$\sqrt{1-\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\ \sqrt{-\sqrt{1+\mathrm{Cot}[c]^2}\ \mathrm{Sin}[c]\,\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\ \sqrt{1+\mathrm{Sin}[d\,x-\mathrm{ArcTan}[\mathrm{Cot}[c]]]}\Bigg) \Big/$$

$$\left(3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\sqrt{1+\mathrm{Cot}[c]^2}\right) + \frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\left(-\frac{4\,(-A-9\,B+29\,C+20\,C\,\mathrm{Cos}[c])\,\mathrm{Csc}[c]}{5\,d} + \frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+9\,B\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]-29\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d} -\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-B\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(4\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9\,B\,\text{Sin}\left[\frac{d\,x}{2}\right]+14\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+$$
$$\left.\frac{4\,(4\,A-9\,B+14\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 472: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 191 leaves, 6 steps):

$$\frac{(A-B-9\,C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(A+B+3\,C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]}{6\,a^3\,d}-$$
$$\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{(4\,A+B-6\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(A-B-9\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1799 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right)-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}\,9\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,Cos[2\,c]+i\,e^{2\,i\,d\,x}\,Sin[2\,c]}\right)\Big/\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,Cos[c]-3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,Sin[c]\right)-$$

$$\left(2\,Hypergeometric2F1\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(Cos[c]+i\,Sin[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)Cos[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)Sin[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2\,i\,d\,x}\,Cos[2\,c]+i\,e^{2\,i\,d\,x}\,Sin[2\,c]}\right)\Big/\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,Cos[c]+d\,\left(-1+e^{2\,i\,d\,x}\right)\,Sin[c]\right)-$$

$$\left(2\,A\,Cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 Csc\left[\frac{c}{2}\right] HypergeometricPFQ\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},Sin[d\,x-ArcTan[Cot[c]]]^2\right] Sec\left[\frac{c}{2}\right] Sec[d\,x-ArcTan[Cot[c]]]\right.$$

$$\sqrt{1-Sin[d\,x-ArcTan[Cot[c]]]}\,\sqrt{-\sqrt{1+Cot[c]^2}\,Sin[c]\,Sin[d\,x-ArcTan[Cot[c]]]}$$

$$\left.\sqrt{1+Sin[d\,x-ArcTan[Cot[c]]]}\right)\Big/\left(3\,d\,(a+a\,Cos[c+d\,x])^3\sqrt{1+Cot[c]^2}\right)-$$

$$\left(2\,B\,Cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 Csc\left[\frac{c}{2}\right] HypergeometricPFQ\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},Sin[d\,x-ArcTan[Cot[c]]]^2\right] Sec\left[\frac{c}{2}\right]\right.$$

$$Sec[d\,x-ArcTan[Cot[c]]]\,\sqrt{1-Sin[d\,x-ArcTan[Cot[c]]]}\,\sqrt{-\sqrt{1+Cot[c]^2}\,Sin[c]\,Sin[d\,x-ArcTan[Cot[c]]]}$$

$$\left.\sqrt{1+Sin[d\,x-ArcTan[Cot[c]]]}\right)\Big/\left(3\,d\,(a+a\,Cos[c+d\,x])^3\sqrt{1+Cot[c]^2}\right)-$$

$$\left(2\,C\,Cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6 Csc\left[\frac{c}{2}\right] HypergeometricPFQ\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},Sin[d\,x-ArcTan[Cot[c]]]^2\right] Sec\left[\frac{c}{2}\right] Sec[d\,x-ArcTan[Cot[c]]]\right.$$

$$\left.\sqrt{1-Sin[d\,x-ArcTan[Cot[c]]]}\,\sqrt{-\sqrt{1+Cot[c]^2}\,Sin[c]\,Sin[d\,x-ArcTan[Cot[c]]]}\,\sqrt{1+Sin[d\,x-ArcTan[Cot[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,Cos[c+d\,x])^3\sqrt{1+Cot[c]^2}\right)+\frac{1}{(a+a\,Cos[c+d\,x])^3}Cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{Cos[c+d\,x]}$$

$$\left(-\frac{4\,(A-B-9\,C)\,Csc[c]}{5\,d}-\frac{4\,Sec\left[\frac{c}{2}\right]Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,Sin\left[\frac{d\,x}{2}\right]-B\,Sin\left[\frac{d\,x}{2}\right]-9\,C\,Sin\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$

$$\frac{4\,Sec\left[\frac{c}{2}\right]Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,Sin\left[\frac{d\,x}{2}\right]+4\,B\,Sin\left[\frac{d\,x}{2}\right]-9\,C\,Sin\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{2\,Sec\left[\frac{c}{2}\right]Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,Sin\left[\frac{d\,x}{2}\right]-B\,Sin\left[\frac{d\,x}{2}\right]+C\,Sin\left[\frac{d\,x}{2}\right]\right)}{5\,d}+$$

$$\left.\frac{4\,(A+4B-9C)\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 473: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 193 leaves, 6 steps):

$$\frac{(9A+B-C)\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]}{10\,a^3\,d}+\frac{(3A+B+C)\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]}{6\,a^3\,d}-\frac{(A-B+C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{(6A-B-4C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(9A+B-C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1802 leaves):

$$\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}9\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)+\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(-i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)\right)-\frac{1}{10\,(a+a\,\text{Cos}[c+d\,x])^3}i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{4},\frac{7}{4},-e^{2\,i\,d\,x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1+e^{2\,i\,d\,x}\,\text{Cos}[2\,c]+i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right)\Big/\left(3\,i\,d\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]-3\,d\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}\,(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\,\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Cos}[c+d x]}$$

$$\left(-\frac{4\,(9 A+B-C)\,\text{Csc}[c]}{5 d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(6 A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]-4 C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{15 d}-\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(9 A\,\text{Sin}\left[\frac{d x}{2}\right]+B\,\text{Sin}\left[\frac{d x}{2}\right]-C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-$$

$$\left.\frac{4\,(6 A-B-4 C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15 d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5 d}\right)$$

**Problem 474: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + B\,\text{Cos}[c+d\,x] + C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a + a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 237 leaves, 7 steps):

$$-\frac{(49\,A - 9\,B - C)\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{10\,a^3\,d} - \frac{(13\,A - 3\,B - C)\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{6\,a^3\,d} + \frac{(49\,A - 9\,B - C)\,\text{Sin}[c+d\,x]}{10\,a^3\,d\,\sqrt{\text{Cos}[c+d\,x]}} - \frac{(A - B + C)\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a + a\,\text{Cos}[c+d\,x])^3} - \frac{(8\,A - 3\,B - 2\,C)\,\text{Sin}[c+d\,x]}{15\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a + a\,\text{Cos}[c+d\,x])^2} - \frac{(13\,A - 3\,B - C)\,\text{Sin}[c+d\,x]}{6\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a^3 + a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 1841 leaves):

$$-\frac{1}{10\,(a + a\,\text{Cos}[c+d\,x])^3}\,49\,i\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] - 3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right) -$$
$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.$$
$$\left.\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right) +$$
$$\frac{1}{10\,(a + a\,\text{Cos}[c+d\,x])^3}\,9\,i\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/$$
$$\left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] - 3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right) - \left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/$$
$$\left.\left(-i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)\right) + \frac{1}{10\,(a + a\,\text{Cos}[c+d\,x])^3}\,i\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]$$
$$\left(\left(2\,e^{2\,i\,d\,x}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{3}{4},\,\frac{7}{4},\,-e^{2\,i\,d\,x}\,(\text{Cos}[c] + i\,\text{Sin}[c])^2\right]\,\sqrt{e^{-i\,d\,x}\,\left(2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] + 2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\right.\right.$$
$$\left.\sqrt{1 + e^{2\,i\,d\,x}\,\text{Cos}[2\,c] + i\,e^{2\,i\,d\,x}\,\text{Sin}[2\,c]}\right) \Big/ \left(3\,i\,d\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c] - 3\,d\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right) -$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)+$$

$$\left(26\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Cos}[c+d x]}$$

$$\left(\frac{2\,(20\,A+29\,A\,\text{Cos}[c]-9\,B\,\text{Cos}[c]-C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(29\,A\,\text{Sin}\left[\frac{d x}{2}\right]-9\,B\,\text{Sin}\left[\frac{d x}{2}\right]-C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5\,d}+\right.$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(11\,A\,\text{Sin}\left[\frac{d x}{2}\right]-6\,B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{15\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5\,d}+$$

$$\left.\frac{16\,A\,\text{Sec}[c]\,\text{Sec}[c+d x]\,\text{Sin}[d x]}{d}+\frac{4\,(11\,A-6\,B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

**Problem 475: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2}{\operatorname{Cos}[c + d x]^{5/2} (a + a \operatorname{Cos}[c + d x])^3} \, dx$$

Optimal (type 4, 270 leaves, 8 steps):

$$\frac{(119 A - 49 B + 9 C) \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right]}{10 a^3 d} + \frac{(33 A - 13 B + 3 C) \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right]}{6 a^3 d} + \frac{(33 A - 13 B + 3 C) \operatorname{Sin}[c + d x]}{6 a^3 d \operatorname{Cos}[c + d x]^{3/2}} - \frac{(119 A - 49 B + 9 C) \operatorname{Sin}[c + d x]}{10 a^3 d \sqrt{\operatorname{Cos}[c + d x]}} - \frac{(A - B + C) \operatorname{Sin}[c + d x]}{5 d \operatorname{Cos}[c + d x]^{3/2} (a + a \operatorname{Cos}[c + d x])^3} - \frac{(2 A - B) \operatorname{Sin}[c + d x]}{3 a d \operatorname{Cos}[c + d x]^{3/2} (a + a \operatorname{Cos}[c + d x])^2} - \frac{(119 A - 49 B + 9 C) \operatorname{Sin}[c + d x]}{30 d \operatorname{Cos}[c + d x]^{3/2} \left(a^3 + a^3 \operatorname{Cos}[c + d x]\right)}$$

Result (type 5, 1883 leaves):

$$\frac{1}{10 (a + a \operatorname{Cos}[c + d x])^3} 119 \, i \, A \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right] \left(\left(2 e^{2 i d x} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right) - \left(2 \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)\right) - \frac{1}{10 (a + a \operatorname{Cos}[c + d x])^3}$$

$$49 \, i \, B \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right] \left(\left(2 e^{2 i d x} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right) - \left(2 \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(-i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)\right) + \frac{1}{10 (a + a \operatorname{Cos}[c + d x])^3} 9 \, i \, C \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]$$

$$\left(\left(2 e^{2 i d x} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{4}, \frac{7}{4}, -e^{2 i d x} (\operatorname{Cos}[c] + i \operatorname{Sin}[c])^2\right] \sqrt{e^{-i d x} \left(2 \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] + 2 i \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right)} \sqrt{1 + e^{2 i d x} \operatorname{Cos}[2 c] + i e^{2 i d x} \operatorname{Sin}[2 c]}\right) \Big/ \left(3 i d \left(1 + e^{2 i d x}\right) \operatorname{Cos}[c] - 3 d \left(-1 + e^{2 i d x}\right) \operatorname{Sin}[c]\right) -$$

$$\left(2\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i d x}(\text{Cos}[c]+i\,\text{Sin}[c])^2\right]\sqrt{e^{-i d x}\left(2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right.$$

$$\left.\sqrt{1+e^{2 i d x}\,\text{Cos}[2 c]+i\,e^{2 i d x}\,\text{Sin}[2 c]}\right)\Big/\left(-i\,d\left(1+e^{2 i d x}\right)\text{Cos}[c]+d\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$

$$\left(22\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+$$

$$\left(26\,B\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\right.$$

$$\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}$$

$$\left.\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/\left(3\,d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)-$$

$$\left(2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{2}\right\},\left\{\frac{5}{4}\right\},\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]^2\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[d x-\text{ArcTan}[\text{Cot}[c]]]\right.$$

$$\left.\sqrt{1-\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{-\sqrt{1+\text{Cot}[c]^2}\,\text{Sin}[c]\,\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\sqrt{1+\text{Sin}[d x-\text{ArcTan}[\text{Cot}[c]]]}\right)\Big/$$

$$\left(d\,(a+a\,\text{Cos}[c+d x])^3\sqrt{1+\text{Cot}[c]^2}\right)+\frac{1}{(a+a\,\text{Cos}[c+d x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Cos}[c+d x]}$$

$$\left(-\frac{2\,(60 A-20 B+59 A\,\text{Cos}[c]-29 B\,\text{Cos}[c]+9 C\,\text{Cos}[c])\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}[c]}{5 d}-\right.$$

$$\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d x}{2}\right]-B\,\text{Sin}\left[\frac{d x}{2}\right]+C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(16 A\,\text{Sin}\left[\frac{d x}{2}\right]-11 B\,\text{Sin}\left[\frac{d x}{2}\right]+6 C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{15 d}-$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(59 A\,\text{Sin}\left[\frac{d x}{2}\right]-29 B\,\text{Sin}\left[\frac{d x}{2}\right]+9 C\,\text{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}+\frac{16 A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{3 d}+$$

$$\frac{16\,\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(A\,\text{Sin}[c]-9\,A\,\text{Sin}[d\,x]+3\,B\,\text{Sin}[d\,x])}{3\,d}-\frac{4\,(16\,A-11\,B+6\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A-B+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\Bigg)$$

- **Problem 476: Result unnecessarily involves imaginary or complex numbers.**

$$\int\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 3, 227 leaves, 6 steps):

$$\frac{\sqrt{a}\,(48\,A+40\,B+35\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{a\,(48\,A+40\,B+35\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{64\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a\,(48\,A+40\,B+35\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{96\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a\,(8\,B+C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{C\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 3, 339 leaves):

$$\frac{1}{768\,d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(\left(3\,i\,(48\,A+40\,B+35\,C)\,e^{\frac{i\,d\,x}{2}}\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]-\right.\right.\right.$$
$$\left.\left.\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\right)$$
$$\left.\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+4\,\sqrt{\text{Cos}[c+d\,x]}$$
$$\left.(144\,A+152\,B+133\,C+2\,(48\,A+40\,B+53\,C)\,\text{Cos}[c+d\,x]+4\,(8\,B+7\,C)\,\text{Cos}[2\,(c+d\,x)]+12\,C\,\text{Cos}[3\,(c+d\,x)])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 477: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 3, 179 leaves, 5 steps):

$$\frac{\sqrt{a}\,(8\,A+6\,B+5\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a\,(8\,A+6\,B+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a\,(6\,B+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{C\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 319 leaves):

$$\frac{1}{96\,d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\left(3\,\mathrm{i}\,(8\,A+6\,B+5\,C)\,e^{\frac{i\,d\,x}{2}}\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]-\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\right)\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+4\sqrt{\text{Cos}[c+d\,x]}\,(24\,A+18\,B+19\,C+2\,(6\,B+5\,C)\,\text{Cos}[c+d\,x]+4\,C\,\text{Cos}[2\,(c+d\,x)])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 478: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 131 leaves, 4 steps):

$$\frac{\sqrt{a}\,(8\,A+4\,B+3\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}+\frac{a\,(4\,B+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 3, 299 leaves):

$$\frac{1}{16\,d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\left(\mathrm{i}\,(8\,A+4\,B+3\,C)\,e^{\frac{i\,d\,x}{2}}\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]-\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\right)\sqrt{e^{-i\,d\,x}\left(2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+4\sqrt{\text{Cos}[c+d\,x]}\,(4\,B+3\,C+2\,C\,\text{Cos}[c+d\,x])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 479: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 121 leaves, 4 steps):

$$\frac{\sqrt{a}\,(2\,B+C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{d}-\frac{a\,(2\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 858 leaves):

$$\frac{1}{2}(2B+C)\sqrt{a(1+\text{Cos}[c+dx])}\ \text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]$$
$$\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{idx}{2}}\,\text{Log}\left[2\left(e^{idx}\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-idx}\left((1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\,\text{Cos}[c]+2\,i\,(-1+e^{2idx})\,\text{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{idx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-idx}\left((1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\,\text{Cos}[c]+2\,i\,(-1+e^{2idx})\,\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{idx}{2}}\,\text{Log}\left[2\left(e^{idx}\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-idx}\left((1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\,\text{Cos}[c]+2\,i\,(-1+e^{2idx})\,\text{Sin}[c]}\right)+$$
$$\left(2\,i\,e^{\frac{idx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-idx}\left((1+e^{2idx})\,\text{Cos}[c]+i\,(-1+e^{2idx})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\,\text{Cos}[c]+2\,i\,(-1+e^{2idx})\,\text{Sin}[c]}\right)\right)\right)+$$
$$\sqrt{\text{Cos}[c+dx]}\sqrt{a(1+\text{Cos}[c+dx])}\ \text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(\frac{C\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{d}+\frac{C\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{d}+\right.$$
$$\left.\frac{2\,A\,\text{Sec}[c+dx]\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]}{d}\right)$$

- **Problem 480: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+dx]}\,\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\text{Cos}[c+dx]^{5/2}}\,dx$$

Optimal (type 3, 120 leaves, 4 steps):

$$\frac{2\sqrt{a}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{d}+\frac{2\,a\,(A+3\,B)\,\text{Sin}[c+dx]}{3\,d\sqrt{\text{Cos}[c+dx]}\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{2\,A\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{3\,d\,\text{Cos}[c+dx]^{3/2}}$$

Result (type 3, 700 leaves):

$$\frac{1}{6\sqrt{2}\,d\,\text{Cos}[c+d x]^{3/2}\sqrt{\text{Cos}[c+d x]}\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}$$

$$\sqrt{a\,(1+\text{Cos}[c+d x])}\ \text{Sec}\left[\frac{1}{2}(c+d x)\right]\left(\frac{3}{2}\,i\,C\,e^{-\frac{3}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\right.$$

$$\text{Cos}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^2-\frac{3}{2}\,i\,C\,e^{-\frac{3}{2} i d x}\,\text{Cos}\left[\frac{c}{2}\right]^2$$

$$\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^2+\frac{3}{2}\,i\,C$$

$$e^{-\frac{3}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\text{Sin}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^2-$$

$$\frac{3}{2}\,i\,C\,e^{-\frac{3}{2} i d x}\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{c}{2}\right]^2$$

$$\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^2+4\,A\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\ \text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$8\,A\,\text{Cos}[c+d x]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\ \text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$\left.12\,B\,\text{Cos}[c+d x]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\ \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 484: Result unnecessarily involves imaginary or complex numbers.**

$$\int \text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^{3/2}\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)dx$$

Optimal (type 3, 283 leaves, 7 steps):

$$\frac{a^{3/2}\,(176 A+150 B+133 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{128\,d}+\frac{a^2\,(176 A+150 B+133 C)\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{128\,d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$

$$\frac{a^2\,(176 A+150 B+133 C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{192\,d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{a^2\,(80 A+90 B+67 C)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{240\,d\sqrt{a+a\,\text{Cos}[c+d x]}}+$$

$$\frac{a\,(10 B+3 C)\,\text{Cos}[c+d x]^{5/2}\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{40\,d}+\frac{C\,\text{Cos}[c+d x]^{5/2}\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{5\,d}$$

Result (type 3, 390 leaves):

$$-\frac{1}{7680\,d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(-15\,i\,(176\,A+150\,B+133\,C)\,e^{\frac{i\,d\,x}{2}}\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]-\right.\right.$$
$$\left.\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\;-4\,\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$(2960\,A+2850\,B+2671\,C+2\,(880\,A+930\,B+1007\,C)\,\mathrm{Cos}[c+d\,x]+4\,(80\,A+150\,B+181\,C)\,\mathrm{Cos}[2\,(c+d\,x)]+$$
$$\left.120\,B\,\mathrm{Cos}[3\,(c+d\,x)]+228\,C\,\mathrm{Cos}[3\,(c+d\,x)]+48\,C\,\mathrm{Cos}[4\,(c+d\,x)])\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\;\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 485: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\;(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 3, 233 leaves, 6 steps):

$$\frac{a^{3/2}\,(112\,A+88\,B+75\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{64\,d}+$$
$$\frac{a^2\,(112\,A+88\,B+75\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{64\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,(48\,A+56\,B+39\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{96\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a\,(8\,B+3\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{24\,d}+\frac{C\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{4\,d}$$

Result (type 3, 365 leaves):

$$-\frac{1}{768\,d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(-3\,i\,(112\,A+88\,B+75\,C)\,e^{\frac{i\,d\,x}{2}}\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]-\right.\right.$$
$$\left.\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}\;-4\,\sqrt{\mathrm{Cos}[c+d\,x]}\;(336\,A+296\,B+285\,C+2\,(48\,A+88\,B+93\,C)\,\mathrm{Cos}[c+d\,x]+$$
$$\left.4\,(8\,B+15\,C)\,\mathrm{Cos}[2\,(c+d\,x)]+12\,C\,\mathrm{Cos}[3\,(c+d\,x)])\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\;\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 486: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 181 leaves, 5 steps):

$$\frac{a^{3/2}\,(24\,A+14\,B+11\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}+\frac{a^2\,(24\,A+30\,B+19\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a\,(2\,B+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 345 leaves):

$$-\frac{1}{96\,d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(-3\,i\,(24\,A+14\,B+11\,C)\,e^{\frac{i\,d\,x}{2}}\,\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\right]-\right.\right.$$
$$\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\Bigg)$$
$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,-4\,\sqrt{\text{Cos}[c+d\,x]}\,(24\,A+42\,B+37\,C+2\,(6\,B+11\,C)\,\text{Cos}[c+d\,x]+4\,C\,\text{Cos}[2\,(c+d\,x)])$$
$$\left.\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 487: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 181 leaves, 5 steps):

$$\frac{a^{3/2}\,(8\,A+12\,B+7\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-\frac{a^2\,(8\,A-4\,B-5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-$$
$$\frac{a\,(4\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 338 leaves):

$$-\frac{1}{16\,d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$

$$\left(-i\,(8\,A+12\,B+7\,C)\,e^{\frac{i\,d\,x}{2}}\left(\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\,\right]-\right.\right.$$

$$\left.\mathrm{Log}\left[2\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\right)$$

$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]\right)}-\frac{1}{\sqrt{\mathrm{Cos}[c+d\,x]}}$$

$$\left.4\,(8\,A+C+(4\,B+7\,C)\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,(c+d\,x)])\,\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 488: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 171 leaves, 5 steps):

$$\frac{a^{3/2}\,(2\,B+3\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}-\frac{a^2\,(8\,A+6\,B-3\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,a\,(A+B)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 3, 920 leaves):

$$\frac{1}{4}(2B+3C)\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3$$

$$\left(\frac{1}{2}\,\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)-$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)+$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\mathrm{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(\frac{C\,\mathrm{Cos}\left[\frac{d\,x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{2\,d}+\frac{C\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{2\,d}+\right.$$

$$\left.\frac{A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{3\,d}+\frac{\mathrm{Sec}[c+d\,x]\left(5\,A\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+3\,B\,\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right)}{3\,d}\right)$$

- **Problem 489: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 3, 172 leaves, 5 steps):

$$\frac{2\,a^{3/2}\,C\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{d}+\frac{2\,a^2\,(12\,A+20\,B+15\,C)\,\mathrm{Sin}[c+d\,x]}{15\,d\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,a\,(3\,A+5\,B)\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}$$

Result (type 3, 850 leaves):

$$\frac{1}{60\sqrt{2}\, d\, \text{Cos}[c+d x]^{5/2}\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}}\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3$$

$$\left(\frac{15}{4} C\, e^{-\frac{5}{2} i d x}\,\text{Cos}\left[\frac{c}{2}\right]^2 \text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\right.$$

$$\left(i\left(1+e^{2 i d x}\right)\text{Cos}[c]-\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+\frac{15}{4} C\, e^{-\frac{5}{2} i d x}\,\text{Log}\Big[$$

$$2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\Big]\,\text{Sin}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right)\text{Cos}[c]-\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+$$

$$\frac{15}{4}\, i\, C\, e^{-\frac{5}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\text{Cos}\left[\frac{c}{2}\right]^2$$

$$\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+\frac{15}{4}\, i\, C\, e^{-\frac{5}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]$$

$$\text{Sin}\left[\frac{c}{2}\right]^2\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)^3+12 A\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$36 A\,\text{Cos}[c+d x]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$20 B\,\text{Cos}[c+d x]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$72\sqrt{2}\, A\,\text{Cos}[c+d x]^2\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$100\sqrt{2}\, B\,\text{Cos}[c+d x]^2\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$

$$\left.60\sqrt{2}\, C\,\text{Cos}[c+d x]^2\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 493: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \text{Cos}[c+d x]^{3/2}\,(a+a\,\text{Cos}[c+d x])^{5/2}\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)dx$$

Optimal (type 3, 333 leaves, 8 steps) :

$$\frac{a^{5/2}\,(1304\,A+1132\,B+1015\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{512\,d}+\frac{a^3\,(1304\,A+1132\,B+1015\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{512\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a^3\,(1304\,A+1132\,B+1015\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{768\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{a^3\,(680\,A+628\,B+545\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{960\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a^2\,(120\,A+156\,B+115\,C)\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{480\,d}+$$

$$\frac{a\,(12\,B+5\,C)\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{60\,d}+\frac{C\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{6\,d}$$

Result (type 3, 1142 leaves) :

$$\frac{1}{4096}\,(1304\,A+1132\,B+1015\,C)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5$$

$$\left(\frac{1}{2}\,\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\,\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{Log}\left[2\,\left(e^{\mathrm{i}\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right)-$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\,\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{Log}\left[2\,\left(e^{\mathrm{i}\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right)+$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right]\,\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\,\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Cos}[c]+2\,\mathrm{i}\,\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\,\text{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(\frac{(1000\,A+896\,B+805\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]}{1920\,d}+\right.$$

$$\frac{(360\,A+340\,B+329\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,\text{Sin}\left[\frac{3\,c}{2}\right]}{2048\,d}+$$

$$\frac{(50\,A+61\,B+65\,C)\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,\text{Sin}\left[\frac{5\,c}{2}\right]}{960\,d}+$$

$$\frac{(24\,A+60\,B+79\,C)\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\,\text{Sin}\left[\frac{7\,c}{2}\right]}{3072\,d}+$$

$$\frac{(2\,B+5\,C)\,\mathrm{Cos}\left[\frac{9\,d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{9\,c}{2}\right]}{640\,d}+$$
$$\frac{C\,\mathrm{Cos}\left[\frac{11\,d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{11\,c}{2}\right]}{768\,d}+$$
$$\frac{(1000\,A+896\,B+805\,C)\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{1920\,d}+$$
$$\frac{(360\,A+340\,B+329\,C)\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{2048\,d}+$$
$$\frac{(50\,A+61\,B+65\,C)\,\mathrm{Cos}\left[\frac{5\,c}{2}\right]\,\mathrm{Sin}\left[\frac{5\,d\,x}{2}\right]}{960\,d}+$$
$$\frac{(24\,A+60\,B+79\,C)\,\mathrm{Cos}\left[\frac{7\,c}{2}\right]\,\mathrm{Sin}\left[\frac{7\,d\,x}{2}\right]}{3072\,d}+$$
$$\left.\frac{(2\,B+5\,C)\,\mathrm{Cos}\left[\frac{9\,c}{2}\right]\,\mathrm{Sin}\left[\frac{9\,d\,x}{2}\right]}{640\,d}+\frac{C\,\mathrm{Cos}\left[\frac{11\,c}{2}\right]\,\mathrm{Sin}\left[\frac{11\,d\,x}{2}\right]}{768\,d}\right)$$

- **Problem 494: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 3, 281 leaves, 7 steps):

$$\frac{a^{5/2}\,(400\,A+326\,B+283\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{128\,d}+\frac{a^3\,(400\,A+326\,B+283\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{128\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a^3\,(1040\,A+950\,B+787\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{960\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2\,(80\,A+110\,B+79\,C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{240\,d}+$$
$$\frac{a\,(2\,B+C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{8\,d}+\frac{C\,\mathrm{Cos}[c+d\,x]^{3/2}\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}$$

Result (type 3, 1082 leaves):

$$\frac{1}{1024}\,(400\,A+326\,B+283\,C)\,(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5$$
$$\left(\frac{1}{2}\,i\,\mathrm{Sin}\left[\frac{c}{2}\right]\,\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\,\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)\right]\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right)\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\,\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\left(a\,(1+\text{Cos}[c+d\,x])\right)^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(\frac{(155\,A+125\,B+112\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Sin}\left[\frac{c}{2}\right]}{240\,d}+\right.$$

$$\frac{5\,(16\,A+18\,B+17\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\,\text{Sin}\left[\frac{3\,c}{2}\right]}{512\,d}+$$

$$\frac{(20\,A+50\,B+61\,C)\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\,\text{Sin}\left[\frac{5\,c}{2}\right]}{960\,d}+$$

$$\frac{(2\,B+5\,C)\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\,\text{Sin}\left[\frac{7\,c}{2}\right]}{256\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{9\,d\,x}{2}\right]\,\text{Sin}\left[\frac{9\,c}{2}\right]}{320\,d}+$$

$$\frac{(155\,A+125\,B+112\,C)\,\text{Cos}\left[\frac{c}{2}\right]\,\text{Sin}\left[\frac{d\,x}{2}\right]}{240\,d}+$$

$$\frac{5\,(16\,A+18\,B+17\,C)\,\text{Cos}\left[\frac{3\,c}{2}\right]\,\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{512\,d}+$$

$$\frac{(20\,A+50\,B+61\,C)\,\text{Cos}\left[\frac{5\,c}{2}\right]\,\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{960\,d}+$$

$$\left.\frac{(2\,B+5\,C)\,\text{Cos}\left[\frac{7\,c}{2}\right]\,\text{Sin}\left[\frac{7\,d\,x}{2}\right]}{256\,d}+\frac{C\,\text{Cos}\left[\frac{9\,c}{2}\right]\,\text{Sin}\left[\frac{9\,d\,x}{2}\right]}{320\,d}\right)$$

- **Problem 495: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 233 leaves, 6 steps):

$$\frac{a^{5/2}\,(304\,A+200\,B+163\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{64\,d}+\frac{a^3\,(432\,A+392\,B+299\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{a^2\,(16\,A+24\,B+17\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,d}+$$
$$\frac{a\,(8\,B+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 3, 364 leaves):

$$-\frac{1}{1536\,d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5$$
$$\left(-3\,i\,(304\,A+200\,B+163\,C)\,e^{\frac{i\,d\,x}{2}}\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}-4\,\sqrt{\text{Cos}[c+d\,x]}\,(528\,A+632\,B+581\,C+(96\,A+272\,B+362\,C)\,\text{Cos}[c+d\,x]+$$
$$\left.4\,(8\,B+23\,C)\,\text{Cos}[2\,(c+d\,x)]+12\,C\,\text{Cos}[3\,(c+d\,x)])\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 496: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 231 leaves, 6 steps):

$$\frac{a^{5/2}\,(40\,A+38\,B+25\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{8\,d}-$$
$$\frac{a^3\,(24\,A-54\,B-49\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{a^2\,(8\,A-2\,B-3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}-$$
$$\frac{a\,(6\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 3, 364 leaves):

$$-\frac{1}{192\,d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5$$
$$\left(-3\,i\,(40\,A+38\,B+25\,C)\,e^{\frac{i\,d\,x}{2}}\,\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,-\frac{1}{\sqrt{\text{Cos}[c+d\,x]}}4\,(48\,A+6\,B+17\,C+3\,(8\,A+22\,B+27\,C)\,\text{Cos}[c+d\,x]+$$
$$\left.(6\,B+17\,C)\,\text{Cos}[2\,(c+d\,x)]+2\,C\,\text{Cos}[3\,(c+d\,x)])\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 497: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 233 leaves, 6 steps):

$$\frac{a^{5/2}\,(8\,A+20\,B+19\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{4\,d}-$$
$$\frac{a^3\,(56\,A+12\,B-27\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{a^2\,(8\,A+4\,B-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{2\,d}+$$
$$\frac{2\,a\,(5\,A+3\,B)\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 3, 364 leaves):

$$-\frac{1}{96\,d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^5$$
$$\left(-3\,i\,(8\,A+20\,B+19\,C)\,e^{\frac{i\,d\,x}{2}}\,\left(\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\right]-\right.\right.$$
$$\left.\text{Log}\left[2\,\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]}\,\right)\right]\right)$$
$$\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\text{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\text{Sin}[c]\right)}\,-\frac{1}{\text{Cos}[c+d\,x]^{3/2}}2\,(16\,A+12\,B+33\,C+(128\,A+48\,B+9\,C)\,\text{Cos}[c+d\,x]+$$
$$\left.3\,(4\,B+11\,C)\,\text{Cos}[2\,(c+d\,x)]+3\,C\,\text{Cos}[3\,(c+d\,x)])\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 498: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a + a \operatorname{Cos}[c + d x])^{5/2} \left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right)}{\operatorname{Cos}[c + d x]^{7/2}} \, dx$$

Optimal (type 3, 223 leaves, 6 steps):

$$\frac{a^{5/2} (2 B + 5 C) \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{d} - \frac{a^3 (64 A + 70 B + 15 C) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Sin}[c + d x]}{15 d \sqrt{a + a \operatorname{Cos}[c + d x]}} +$$

$$\frac{2 a^2 (8 A + 10 B + 5 C) \sqrt{a + a \operatorname{Cos}[c + d x]} \operatorname{Sin}[c + d x]}{5 d \sqrt{\operatorname{Cos}[c + d x]}} + \frac{2 a (A + B) (a + a \operatorname{Cos}[c + d x])^{3/2} \operatorname{Sin}[c + d x]}{3 d \operatorname{Cos}[c + d x]^{3/2}} + \frac{2 A (a + a \operatorname{Cos}[c + d x])^{5/2} \operatorname{Sin}[c + d x]}{5 d \operatorname{Cos}[c + d x]^{5/2}}$$

Result (type 3, 984 leaves):

$$\frac{1}{8}(2B+5C)(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5$$
$$\left(\frac{1}{2}\,\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i} d x}{2}}\,\text{Log}\left[2\left(e^{\mathrm{i} d x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i} d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-\mathrm{i} d x}\left((1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+2\,\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right)-$$
$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i} d x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-\mathrm{i} d x}\left((1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+2\,\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i} d x}{2}}\,\text{Log}\left[2\left(e^{\mathrm{i} d x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i} d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-\mathrm{i} d x}\left((1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+2\,\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right)+$$
$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i} d x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-\mathrm{i} d x}\left((1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2\mathrm{i} d x})\,\text{Cos}[c]+2\,\mathrm{i}\,(-1+e^{2\mathrm{i} d x})\,\text{Sin}[c]}\right)\right)\right)+$$
$$\sqrt{\text{Cos}[c+dx]}\,(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\left(\frac{C\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{4d}+\frac{C\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{4d}+\right.$$
$$\frac{A\,\text{Sec}[c+dx]^3\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]}{10d}+$$
$$\frac{\text{Sec}[c+dx]^2\left(14A\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]+5B\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}{30d}+$$
$$\left.\frac{\text{Sec}[c+dx]\left(43A\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]+40B\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]+15C\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]\right)}{30d}\right)$$

- **Problem 499: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+dx])^{5/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\text{Cos}[c+dx]^{9/2}}\,dx$$

Optimal (type 3, 222 leaves, 6 steps):

$$\frac{2a^{5/2}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]}{d}+\frac{2a^3\,(160A+224B+245C)\,\text{Sin}[c+dx]}{105d\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{2a^2\,(40A+56B+35C)\,\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{105d\,\text{Cos}[c+dx]^{3/2}}+$$
$$\frac{2a\,(5A+7B)\,(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sin}[c+dx]}{35d\,\text{Cos}[c+dx]^{5/2}}+\frac{2A\,(a+a\,\text{Cos}[c+dx])^{5/2}\,\text{Sin}[c+dx]}{7d\,\text{Cos}[c+dx]^{7/2}}$$

Result (type 3, 1000 leaves):

$$\frac{1}{4} C \left(a \left(1+\cos[c+d x]\right)\right)^{5/2} \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\frac{1}{2} i \sin\left[\frac{c}{2}\right] \left(-\left(2 i e^{\frac{i d x}{2}} \log\left[2 \left(e^{i d x} \cos\left[\frac{c}{2}\right]+i e^{i d x} \sin\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right] \left(\cos\left[\frac{c}{2}\right]-i \sin\left[\frac{c}{2}\right]\right) \sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \cos[c]+2 i \left(-1+e^{2 i d x}\right) \sin[c]}\right) - \left(2 i e^{\frac{i d x}{2}} \text{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i \sin\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]}\right] \left(\cos\left[\frac{c}{2}\right]+i \sin\left[\frac{c}{2}\right]\right) \sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \cos[c]+2 i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right) + \frac{1}{2} \cos\left[\frac{c}{2}\right] \left(-\left(2 i e^{\frac{i d x}{2}} \log\left[2 \left(e^{i d x} \cos\left[\frac{c}{2}\right]+i e^{i d x} \sin\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right] \left(\cos\left[\frac{c}{2}\right]-i \sin\left[\frac{c}{2}\right]\right) \sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \cos[c]+2 i \left(-1+e^{2 i d x}\right) \sin[c]}\right) + \left(2 i e^{\frac{i d x}{2}} \text{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i \sin\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]}\right] \left(\cos\left[\frac{c}{2}\right]+i \sin\left[\frac{c}{2}\right]\right) \sqrt{e^{-i d x} \left(\left(1+e^{2 i d x}\right) \cos[c]+i \left(-1+e^{2 i d x}\right) \sin[c]\right)}\right) \Big/ \left(d \sqrt{2 \left(1+e^{2 i d x}\right) \cos[c]+2 i \left(-1+e^{2 i d x}\right) \sin[c]}\right)\right)\right) +$$

$$\sqrt{\cos[c+d x]} \left(a \left(1+\cos[c+d x]\right)\right)^{5/2} \sec\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\frac{A \sec[c+d x]^4 \sin\left[\frac{c}{2}+\frac{d x}{2}\right]}{14 d} + \frac{\sec[c+d x]^3 \left(20 A \sin\left[\frac{c}{2}+\frac{d x}{2}\right]+7 B \sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}{70 d} + \frac{\sec[c+d x]^2 \left(115 A \sin\left[\frac{c}{2}+\frac{d x}{2}\right]+98 B \sin\left[\frac{c}{2}+\frac{d x}{2}\right]+35 C \sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}{210 d} + \frac{\sec[c+d x] \left(230 A \sin\left[\frac{c}{2}+\frac{d x}{2}\right]+301 B \sin\left[\frac{c}{2}+\frac{d x}{2}\right]+280 C \sin\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}{210 d}\right)$$

## ■ Problem 503: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\cos[c+d x]^{3/2} \left(A+B \cos[c+d x]+C \cos[c+d x]^2\right)}{\sqrt{a+a \cos[c+d x]}} \, dx$$

Optimal (type 3, 241 leaves, 8 steps):

$$-\frac{(8A-14B+9C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{8\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B+C)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+$$
$$\frac{(8A-2B+7C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{(6B-C)\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{C\,\mathrm{Cos}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 449 leaves) :

$$\frac{1}{48\,d\,\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}}$$
$$\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}3\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(-8\,A\,d\,x+14\,B\,d\,x-9\,C\,d\,x+i\,(8A-14B+9C)\,\mathrm{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-\right.\right.$$
$$16\,i\,\sqrt{2}\,(A-B+C)\,\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]-8\,i\,A\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+14\,i\,B\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-$$
$$9\,i\,C\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+16\,i\,\sqrt{2}\,A\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-$$
$$\left.16\,i\,\sqrt{2}\,B\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+16\,i\,\sqrt{2}\,C\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$
$$\left.4\sqrt{\mathrm{Cos}[c+d\,x]}\,(24A-6B+25C+2\,(6B-C)\,\mathrm{Cos}[c+d\,x]+4\,C\,\mathrm{Cos}[2\,(c+d\,x)])\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 504: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 195 leaves, 7 steps) :

$$\frac{(8A-4B+7C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{4\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B+C)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+$$
$$\frac{(4B-C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}+\frac{C\,\mathrm{Cos}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 431 leaves) :

$$\frac{1}{8\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{1}{d\sqrt{1+e^{2\,i\,(c+d\,x)}}}\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(8\,A\,d\,x-4\,B\,d\,x+7\,C\,d\,x-i\,(8\,A-4\,B+7\,C)\,\mathrm{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+8\,i\sqrt{2}\,(A-B+C)\,\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]+8\,i\,A\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-4\,i\,B\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+7\,i\,C\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\sqrt{2}\,A\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+8\,i\sqrt{2}\,B\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\sqrt{2}\,C\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\sqrt{\mathrm{Cos}[c+d\,x]}\,(4\,B-C+2\,C\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{d}\right)$$

- **Problem 505: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 141 leaves, 6 steps):

$$\frac{(2\,B-C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{\sqrt{2}\,(A-B+C)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{2}\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{C\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 3, 383 leaves):

$$\frac{1}{2\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}}\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\left(\frac{1}{d\sqrt{1+e^{2\,i\,(c+d\,x)}}}\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(2\,B\,d\,x-C\,d\,x-i\,(2\,B-C)\,\mathrm{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-2\,i\sqrt{2}\,(A-B+C)\,\mathrm{Log}\left[1+e^{i\,(c+d\,x)}\right]+2\,i\,B\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,C\,\mathrm{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+2\,i\sqrt{2}\,A\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,i\sqrt{2}\,B\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+2\,i\sqrt{2}\,C\,\mathrm{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,C\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{d}\right)$$

- **Problem 506: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{3/2}\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 138 leaves, 6 steps):

$$\frac{2\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}-\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 340 leaves):

$$\frac{1}{d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\right.$$
$$\left(C\,d\,x-i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+i\,\sqrt{2}\,(A-B+C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+\right.$$
$$\left.\left.i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 507: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 143 leaves, 5 steps):

$$\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-3\,B)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 207 leaves):

$$\frac{1}{3\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\left(-1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)3\,i\,(A-B+C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$\left.\frac{2\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}[c+d\,x]^{3/2}}-\frac{2\,(A-3\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right)$$

- **Problem 508: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 191 leaves, 6 steps):

$$-\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-5\,B)\,\text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,(13\,A-5\,B+15\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 239 leaves) :

$$\left(2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)15\,i\,(A-B+C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{6\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}[c+d\,x]^{5/2}}-\frac{2\,(A-5\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,(13\,A-5\,B+15\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right)\right)\Big/\left(15\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

- **Problem 509: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{9/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 237 leaves, 7 steps) :

$$\frac{\sqrt{2}\,(A-B+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{\sqrt{a}\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(A-7\,B)\,\text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,(31\,A-7\,B+35\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(43\,A-91\,B+35\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 262 leaves) :

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)2\,i\,(A-B+C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-1\Big/\left(105\,d\,\text{Cos}[c+d\,x]^{7/2}\right)\,(-122\,A+14\,B-70\,C+3\,(47\,A-119\,B+35\,C)\,\text{Cos}[c+d\,x]-2\,(31\,A-7\,B+35\,C)\,\text{Cos}[2\,(c+d\,x)]+43\,A\,\text{Cos}[3\,(c+d\,x)]-91\,B\,\text{Cos}[3\,(c+d\,x)]+35\,C\,\text{Cos}[3\,(c+d\,x)])\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 510: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\sqrt{\text{Cos}[c+d x]}\,\left(a A+(A b+a B)\,\text{Cos}[c+d x]+b B\,\text{Cos}[c+d x]^2\right)}{\sqrt{a+a\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 3, 213 leaves, 7 steps):

$$\frac{(8 a A-4 A b-4 a B+7 b B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{4\sqrt{a}\,d}-\frac{\sqrt{2}\,(a-b)\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{\sqrt{a}\,d}+$$
$$\frac{(4 A b+4 a B-b B)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{b B\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2 d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 540 leaves):

$$\frac{1}{8\sqrt{a\,(1+\text{Cos}[c+d x])}}$$
$$\text{Cos}\left[\frac{1}{2}(c+d x)\right]\left(\frac{1}{d\sqrt{1+e^{2 i (c+d x)}}}\sqrt{2}\,e^{\frac{1}{2} i (c+d x)}\sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\,\Big(8 a A d x-4 A b d x-4 a B d x+7 b B d x-i\,(8 a A-4 A b-4 a B+7 b B)\right.$$
$$\text{ArcSinh}\left[e^{i (c+d x)}\right]+8 i\sqrt{2}\,(a-b)\,(A-B)\,\text{Log}\left[1+e^{i (c+d x)}\right]+8 i\,a A\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-4 i\,A b\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-$$
$$4 i\,a B\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+7 i\,b B\,\text{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-8 i\sqrt{2}\,a A\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]+$$
$$8 i\sqrt{2}\,A b\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]+8 i\sqrt{2}\,a B\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]-$$
$$\left.8 i\sqrt{2}\,b B\,\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]\Big)+\frac{4\sqrt{\text{Cos}[c+d x]}\,(4 A b+4 a B-b B+2 b B\,\text{Cos}[c+d x])\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{d}\right)$$

## Problem 511: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cos}[c+d x]^{3/2}\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{(a+a\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 3, 260 leaves, 8 steps):

$$\frac{(8 A-12 B+19 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{4 a^{3/2} d}-\frac{(5 A-9 B+13 C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+a\,\text{Cos}[c+d x]}}\right]}{2\sqrt{2}\,a^{3/2} d}-$$
$$\frac{(A-B+C)\,\text{Cos}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{2 d\,(a+a\,\text{Cos}[c+d x])^{3/2}}-\frac{(2 A-6 B+7 C)\,\sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 a d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{(A-B+2 C)\,\text{Cos}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{2 a d\sqrt{a+a\,\text{Cos}[c+d x]}}$$

Result (type 3, 462 leaves):

$$\frac{1}{4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(8\,A\,d\,x-12\,B\,d\,x+19\,C\,d\,x-i\,(8\,A-12\,B+19\,C)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\right.\right.$$

$$2\,i\,\sqrt{2}\,(5\,A-9\,B+13\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+8\,i\,A\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-12\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+$$

$$19\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-10\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+$$

$$\left.18\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-26\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$

$$\left.2\,\sqrt{\text{Cos}[c+d\,x]}\,(-2\,A+6\,B-6\,C+(4\,B-3\,C)\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 512: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 202 leaves, 7 steps):

$$\frac{(2\,B-3\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{(A-5\,B+9\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-$$

$$\frac{(A-B+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(A-B+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 413 leaves):

$$\frac{1}{2\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$

$$\left(\frac{1}{d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(4\,B\,d\,x-6\,C\,d\,x-2\,i\,(2\,B-3\,C)\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(A-5\,B+9\,C)\right.\right.$$

$$\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+4\,i\,B\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-6\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-$$

$$\left.5\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+9\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$

$$\left.\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,(A-B+3\,C+2\,C\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d}\right)$$

- **Problem 513: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,\left(a+a\,\text{Cos}[c+d\,x]\right)^{3/2}}\,dx$$

Optimal (type 3, 149 leaves, 6 steps):

$$\frac{2\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{a^{3/2}\,d}+\frac{(3\,A+B-5\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\left(a+a\,\text{Cos}[c+d\,x]\right)^{3/2}}$$

Result (type 3, 366 leaves):

$$\frac{1}{2\,\left(a\,\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(4\,C\,d\,x-4\,i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(3\,A+B-5\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$
$$4\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+3\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-$$
$$\left.\left.5\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\frac{2\,(A-B+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d}\right)$$

- **Problem 514: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,\left(a+a\,\text{Cos}[c+d\,x]\right)^{3/2}}\,dx$$

Optimal (type 3, 161 leaves, 5 steps):

$$-\frac{(7\,A-3\,B-C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\left(a+a\,\text{Cos}[c+d\,x]\right)^{3/2}}+\frac{(5\,A-B+C)\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 213 leaves):

$$\frac{1}{\left(a\,\left(1+\text{Cos}[c+d\,x]\right)\right)^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3$$
$$\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)i\,(7\,A-3\,B-C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$\left.\frac{\left(4\,A+(5\,A-B+C)\,\text{Cos}[c+d\,x]\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\,\sqrt{\text{Cos}[c+d\,x]}}\right)$$

## Problem 515: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 213 leaves, 6 steps):

$$\frac{(11\,A-7\,B+3\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{2\,d\,\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(7\,A-3\,B+3\,C)\,\text{Sin}[c+d\,x]}{6\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(19\,A-15\,B+3\,C)\,\text{Sin}[c+d\,x]}{6\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 239 leaves):

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(-1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,(11\,A-7\,B+3\,C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-1\Big/\left(6\,d\,\text{Cos}[c+d\,x]^{3/2}\right)\,(11\,A-15\,B+3\,C+24\,(A-B)\,\text{Cos}[c+d\,x]+(19\,A-15\,B+3\,C)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 516: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 263 leaves, 7 steps):

$$-\frac{(15\,A-11\,B+7\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{2\,d\,\text{Cos}[c+d\,x]^{5/2}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(9\,A-5\,B+5\,C)\,\text{Sin}[c+d\,x]}{10\,a\,d\,\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(39\,A-35\,B+15\,C)\,\text{Sin}[c+d\,x]}{30\,a\,d\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{(147\,A-95\,B+75\,C)\,\text{Sin}[c+d\,x]}{30\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 277 leaves):

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^3\left(1\Big/\left(d\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)\,i\,(15\,A-11\,B+7\,C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{e^{-i\,(c+d\,x)}\,\left(1+e^{2\,i\,(c+d\,x)}\right)}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+1\Big/\left(60\,d\,\text{Cos}[c+d\,x]^{5/2}\right)\,(264\,A-120\,B+120\,C+(393\,A-205\,B+225\,C)\,\text{Cos}[c+d\,x]+24\,(9\,A-5\,B+5\,C)\,\text{Cos}[2\,(c+d\,x)]+147\,A\,\text{Cos}[3\,(c+d\,x)]-95\,B\,\text{Cos}[3\,(c+d\,x)]+75\,C\,\text{Cos}[3\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 517: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\operatorname{Cos}[c+d x]^{3/2}\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right)}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 254 leaves, 8 steps):

$$\frac{(2 B-5 C) \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{a^{5/2} d}+\frac{(3 A-43 B+115 C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-$$

$$\frac{(A-B+C) \operatorname{Cos}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}+\frac{(A+7 B-15 C) \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(3 A-11 B+35 C) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 434 leaves):

$$\frac{1}{8 d (a (1+\operatorname{Cos}[c+d x]))^{5/2}} \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^5$$

$$\left(\frac{1}{\sqrt{1+e^{2 i (c+d x)}}} \sqrt{2} e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)}\left(1+e^{2 i (c+d x)}\right)}\left(32 B d x-80 C d x-16 i (2 B-5 C) \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]-i \sqrt{2} (3 A-43 B+115 C)\right.\right.$$

$$\operatorname{Log}\left[1+e^{i (c+d x)}\right]+32 i B \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-80 i C \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+3 i \sqrt{2} A \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]-$$

$$\left.43 i \sqrt{2} B \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]+115 i \sqrt{2} C \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+$$

$$\left.\sqrt{\operatorname{Cos}[c+d x]} (3 A-11 B+43 C+(7 A-15 B+55 C) \operatorname{Cos}[c+d x]+8 C \operatorname{Cos}[2 (c+d x)]) \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)$$

## Problem 518: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]}\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right)}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 201 leaves, 7 steps):

$$\frac{2 C \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{a^{5/2} d}+\frac{(5 A+3 B-43 C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-$$

$$\frac{(A-B+C) \operatorname{Cos}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}+\frac{(5 A+3 B-11 C) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 3, 385 leaves):

$$\frac{1}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5$$
$$\left(\frac{1}{\sqrt{1+e^{2\,i\,(c+d\,x)}}}\sqrt{2}\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(32\,C\,d\,x-32\,i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(5\,A+3\,B-43\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+\right.\right.$$
$$32\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+5\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+$$
$$\left.3\,i\,\sqrt{2}\,B\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-43\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+$$
$$\left.\sqrt{\text{Cos}[c+d\,x]}\,(5\,A+3\,B-11\,C+(A+7\,B-15\,C)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

## Problem 519: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 163 leaves, 5 steps):

$$\frac{(19\,A+5\,B+3\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A-B+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-\frac{(9\,A-B-7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 3, 226 leaves):

$$\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^5\right.$$
$$\left(-1\Big/\left(\sqrt{1+e^{2\,i\,(c+d\,x)}}\right)i\,(19\,A+5\,B+3\,C)\,e^{\frac{1}{2}\,i\,(c+d\,x)}\sqrt{e^{-i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$
$$\left.\left.\frac{1}{2}\sqrt{\text{Cos}[c+d\,x]}\,(13\,A-5\,B-3\,C+(9\,A-B-7\,C)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^3\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/\left(4\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\right)$$

## Problem 520: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 211 leaves, 6 steps):

$$-\frac{(75\,A-19\,B-5\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A-B+C)\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{5/2}}-$$
$$\frac{(13\,A-5\,B-3\,C)\,\text{Sin}[c+d\,x]}{16\,a\,d\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(49\,A-9\,B+C)\,\text{Sin}[c+d\,x]}{16\,a^2\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 242 leaves) :

$$\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^5 \left(1\Big/\left(\sqrt{1+e^{2 i (c+d x)}}\right) i (75 A-19 B-5 C) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+ 1\Big/\left(4 \sqrt{\text{Cos}[c+d x]}\right) (113 A-9 B+C+2 (85 A-13 B+5 C) \text{Cos}[c+d x]+(49 A-9 B+C) \text{Cos}[2 (c+d x)]) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(4 d (a (1+\text{Cos}[c+d x]))^{5/2}\right)$$

- **Problem 521: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{5/2} (a+a \text{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 261 leaves, 7 steps) :

$$\frac{(163 A-75 B+19 C) \text{ArcTan}\left[\frac{\sqrt{a} \text{Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right]}{16 \sqrt{2} a^{5/2} d}-\frac{(A-B+C) \text{Sin}[c+d x]}{4 d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{5/2}}- \frac{(17 A-9 B+C) \text{Sin}[c+d x]}{16 a d \text{Cos}[c+d x]^{3/2} (a+a \text{Cos}[c+d x])^{3/2}}+\frac{(95 A-39 B+15 C) \text{Sin}[c+d x]}{48 a^2 d \text{Cos}[c+d x]^{3/2} \sqrt{a+a \text{Cos}[c+d x]}}-\frac{(299 A-147 B+27 C) \text{Sin}[c+d x]}{48 a^2 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}$$

Result (type 3, 279 leaves) :

$$-\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]^5 \left(1\Big/\left(\sqrt{1+e^{2 i (c+d x)}}\right) 3 i (163 A-75 B+19 C) e^{\frac{1}{2} i (c+d x)} \sqrt{e^{-i (c+d x)} \left(1+e^{2 i (c+d x)}\right)} \left(\text{Log}\left[1+e^{i (c+d x)}\right]-\text{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+ 1\Big/\left(8 \text{Cos}[c+d x]^{3/2}\right) (878 A-510 B+78 C+(1537 A-825 B+81 C) \text{Cos}[c+d x]+2 (503 A-255 B+39 C) \text{Cos}[2 (c+d x)]+299 A \text{Cos}[3 (c+d x)]-147 B \text{Cos}[3 (c+d x)]+27 C \text{Cos}[3 (c+d x)]) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \text{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right)\Big/\left(12 d (a (1+\text{Cos}[c+d x]))^{5/2}\right)$$

- **Problem 525: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x]) \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x] \, dx$$

Optimal (type 3, 58 leaves, 4 steps) :

$$\frac{1}{2} b (2 A+C) x+\frac{a A \text{ArcTanh}[\text{Sin}[c+d x]]}{d}+\frac{a C \text{Sin}[c+d x]}{d}+\frac{b C \text{Cos}[c+d x] \text{Sin}[c+d x]}{2 d}$$

Result (type 3, 131 leaves) :

$$A b x+\frac{b C (c+d x)}{2 d}-\frac{a A \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a A \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a C \text{Cos}[d x] \text{Sin}[c]}{d}+\frac{a C \text{Cos}[c] \text{Sin}[d x]}{d}+\frac{b C \text{Sin}[2 (c+d x)]}{4 d}$$

- **Problem 526: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x]) \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^2 \, dx$$

Optimal (type 3, 42 leaves, 4 steps):

$$a C x+\frac{A b \text{ArcTanh}[\text{Sin}[c+d x]]}{d}+\frac{b C \text{Sin}[c+d x]}{d}+\frac{a A \text{Tan}[c+d x]}{d}$$

Result (type 3, 112 leaves):

$$a C x-\frac{A b \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{A b \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{b C \text{Cos}[d x] \text{Sin}[c]}{d}+\frac{b C \text{Cos}[c] \text{Sin}[d x]}{d}+\frac{a A \text{Tan}[c+d x]}{d}$$

- **Problem 527: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x]) \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3 \, dx$$

Optimal (type 3, 58 leaves, 4 steps):

$$b C x+\frac{a (A+2 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}+\frac{A b \text{Tan}[c+d x]}{d}+\frac{a A \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 d}$$

Result (type 3, 218 leaves):

$$b C x-\frac{a C \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{a C \text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}-\frac{a A \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{a A \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{a A}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}-\frac{a A}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{A b \text{Tan}[c+d x]}{d}$$

- **Problem 529: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x]) \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 117 leaves, 7 steps):

$$\frac{a\,(3A+4C)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{b\,(2A+3C)\,\text{Tan}[c+d x]}{3 d}+\frac{a\,(3A+4C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{8 d}+\frac{A b\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3 d}+\frac{a A\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]}{4 d}$$

Result (type 3, 377 leaves) :

$$-\frac{3 a A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d}-\frac{a C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+\frac{3 a A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d}+\frac{a C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+\frac{a A}{16 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{3 a A}{16 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{a C}{4 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{a A}{16 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}-\frac{3 a A}{16 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{a C}{4 d\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{2 A b\,\text{Tan}[c+d x]}{3 d}+\frac{b C\,\text{Tan}[c+d x]}{d}+\frac{A b\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3 d}$$

## Problem 530: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d x])\left(A+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^6\,dx$$

Optimal (type 3, 140 leaves, 7 steps) :

$$\frac{b\,(3A+4C)\,\text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{a\,(4A+5C)\,\text{Tan}[c+d x]}{5 d}+\frac{b\,(3A+4C)\,\text{Sec}[c+d x]\,\text{Tan}[c+d x]}{8 d}+\frac{A b\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]}{4 d}+\frac{a A\,\text{Sec}[c+d x]^4\,\text{Tan}[c+d x]}{5 d}+\frac{a\,(4A+5C)\,\text{Tan}[c+d x]^3}{15 d}$$

Result (type 3, 426 leaves) :

$$-\frac{3\,A\,b\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}-\frac{b\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+$$
$$\frac{3\,A\,b\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{b\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{2\,d}+\frac{A\,b}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+$$
$$\frac{3\,A\,b}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{b\,C}{4\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{A\,b}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}-$$
$$\frac{3\,A\,b}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{b\,C}{4\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{8\,a\,A\,\text{Tan}[c+d\,x]}{15\,d}+$$
$$\frac{2\,a\,C\,\text{Tan}[c+d\,x]}{3\,d}+\frac{4\,a\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{15\,d}+\frac{a\,C\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,A\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

## Problem 536: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 103 leaves, 5 steps):

$$2\,a\,b\,C\,x+\frac{\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}-$$
$$\frac{b^2\,(A-2\,C)\,\text{Sin}[c+d\,x]}{2\,d}+\frac{a\,A\,b\,\text{Tan}[c+d\,x]}{d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 249 leaves):

$$\frac{1}{4\,d}\left(8\,a\,b\,C\,(c+d\,x)-2\,\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$2\,\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\left.\frac{8\,a\,A\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{8\,a\,A\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+4\,b^2\,C\,\text{Sin}[c+d\,x]\right)$$

## Problem 537: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 112 leaves, 5 steps):

$$b^2 C x+\frac{a b (A+2 C) \text{ArcTanh}[\text{Sin}[c+d x]]}{d}+\frac{\left(2 A b^2+a^2 (2 A+3 C)\right) \text{Tan}[c+d x]}{3 d}+$$
$$\frac{a A b \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 d}+\frac{A (a+b \text{Cos}[c+d x])^2 \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

Result (type 3, 424 leaves) :

$$\frac{b^2 C (c+d x)}{d}+\frac{(-a A b-2 a b C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d}+$$
$$\frac{(a A b+2 a b C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{d}+\frac{a^2 A+6 a A b}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$
$$\frac{a^2 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{a^2 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{-a^2 A-6 a A b}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$
$$\frac{2 a^2 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 A b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^2 C \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{2 a^2 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 A b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^2 C \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}$$

- **Problem 538: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x])^2 \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 154 leaves, 7 steps) :

$$\frac{\left(4 b^2 (A+2 C)+a^2 (3 A+4 C)\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{2 a b (2 A+3 C) \text{Tan}[c+d x]}{3 d}+$$
$$\frac{\left(2 A b^2+a^2 (3 A+4 C)\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{8 d}+\frac{a A b \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{6 d}+\frac{A (a+b \text{Cos}[c+d x])^2 \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{4 d}$$

Result (type 3, 503 leaves) :

$$\frac{\left(-3 a^2 A-4 A b^2-4 a^2 C-8 b^2 C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+\frac{\left(3 a^2 A+4 A b^2+4 a^2 C+8 b^2 C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+$$

$$\frac{a^2 A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{9 a^2 A+8 a A b+12 A b^2+12 a^2 C}{48 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{a A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}-$$

$$\frac{a^2 A}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{a A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{-9 a^2 A-8 a A b-12 A b^2-12 a^2 C}{48 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{2 \left(2 a A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a b C \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{2 \left(2 a A b \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a b C \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}$$

- **Problem 545: Result more than twice size of optimal antiderivative.**

$$\int (a+b \,\text{Cos}[c+d x])^3 \left(A+C \,\text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 163 leaves, 6 steps):

$$3 a b^2 C x+\frac{b \left(2 A b^2+3 a^2 (A+2 C)\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}-\frac{b^3 (5 A-6 C) \,\text{Sin}[c+d x]}{6 d}+\frac{a \left(3 A b^2+a^2 (2 A+3 C)\right) \text{Tan}[c+d x]}{3 d}+$$

$$\frac{A b (a+b \,\text{Cos}[c+d x])^2 \,\text{Sec}[c+d x] \,\text{Tan}[c+d x]}{2 d}+\frac{A (a+b \,\text{Cos}[c+d x])^3 \,\text{Sec}[c+d x]^2 \,\text{Tan}[c+d x]}{3 d}$$

Result (type 3, 473 leaves):

$$\frac{3 a b^2 C (c+d x)}{d}+\frac{\left(-3 a^2 A b-2 A b^3-6 a^2 b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+$$

$$\frac{\left(3 a^2 A b+2 A b^3+6 a^2 b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{a^3 A+9 a^2 A b}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+$$

$$\frac{-a^3 A-9 a^2 A b}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{2 a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a A b^2 \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^3 C \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$

$$\frac{2 a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a A b^2 \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^3 C \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{b^3 C \,\text{Sin}[c+d x]}{d}$$

### Problem 546: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^3\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 3, 182 leaves, 6 steps):

$$b^3\,C\,x+\frac{a\left(12\,b^2\,(A+2\,C)+a^2\,(3\,A+4\,C)\right)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{b\left(A\,b^2+a^2\,(4\,A+6\,C)\right)\,\mathrm{Tan}[c+d\,x]}{2\,d}+\frac{a\left(2\,A\,b^2+a^2\,(3\,A+4\,C)\right)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{8\,d}+\frac{A\,b\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+b\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 562 leaves):

$$\frac{b^3\,C\,(c+d\,x)}{d}+\frac{\left(-3\,a^3\,A-12\,a\,A\,b^2-4\,a^3\,C-24\,a\,b^2\,C\right)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{\left(3\,a^3\,A+12\,a\,A\,b^2+4\,a^3\,C+24\,a\,b^2\,C\right)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{a^3\,A}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{3\,a^3\,A+4\,a^2\,A\,b+12\,a\,A\,b^2+4\,a^3\,C}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{a^2\,A\,b\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\,d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{a^3\,A}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{a^2\,A\,b\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\,d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{-3\,a^3\,A-4\,a^2\,A\,b-12\,a\,A\,b^2-4\,a^3\,C}{16\,d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{2\,a^2\,A\,b\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+A\,b^3\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^2\,b\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{2\,a^2\,A\,b\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+A\,b^3\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^2\,b\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{d\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

### Problem 554: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^4\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 251 leaves, 7 steps):

$$\frac{1}{2} b^2 \left(2 A b^2+\left(12 a^2+b^2\right) C\right) x+\frac{2 a b \left(2 A b^2+a^2 (A+2 C)\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{d}-\frac{2 a b \left(b^2 (11 A-6 C)+a^2 (2 A+3 C)\right) \text{Sin}[c+d x]}{3 d}-\frac{b^2 \left(3 b^2 (6 A-C)+a^2 (4 A+6 C)\right) \text{Cos}[c+d x] \text{Sin}[c+d x]}{6 d}+\frac{\left(6 A b^2+a^2 (2 A+3 C)\right) (a+b \text{Cos}[c+d x])^2 \text{Tan}[c+d x]}{3 d}+\frac{2 A b (a+b \text{Cos}[c+d x])^3 \text{Sec}[c+d x] \text{Tan}[c+d x]}{3 d}+\frac{A (a+b \text{Cos}[c+d x])^4 \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

Result (type 3, 864 leaves) :

$$\frac{b^2 \left(2 A b^2+12 a^2 C+b^2 C\right) (c+d x) \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4}{2 d (a+b \text{Cos}[c+d x])^4}-\frac{2 \left(a^3 A b+2 a A b^3+2 a^3 b C\right) \text{Cos}[c+d x]^4 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right] (b+a \text{Sec}[c+d x])^4}{d (a+b \text{Cos}[c+d x])^4}+\frac{2 \left(a^3 A b+2 a A b^3+2 a^3 b C\right) \text{Cos}[c+d x]^4 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right] (b+a \text{Sec}[c+d x])^4}{d (a+b \text{Cos}[c+d x])^4}+\frac{\left(a^4 A+12 a^3 A b\right) \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4}{12 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{a^4 A \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{a^4 A \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{\left(-a^4 A-12 a^3 A b\right) \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4}{12 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\left(\text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \left(2 a^4 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]+18 a^2 A b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^4 C \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right) \Big/ \left(3 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)+\left(\text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \left(2 a^4 A \text{Sin}\left[\frac{1}{2} (c+d x)\right]+18 a^2 A b^2 \text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^4 C \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right) \Big/ \left(3 d (a+b \text{Cos}[c+d x])^4 \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)\right)+\frac{4 a b^3 C \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}[c+d x]}{d (a+b \text{Cos}[c+d x])^4}+\frac{b^4 C \text{Cos}[c+d x]^4 (b+a \text{Sec}[c+d x])^4 \text{Sin}[2 (c+d x)]}{4 d (a+b \text{Cos}[c+d x])^4}$$

- **Problem 555: Result more than twice size of optimal antiderivative.**

$$\int (a+b \text{Cos}[c+d x])^4 \left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^5 \, dx$$

Optimal (type 3, 246 leaves, 7 steps) :

$$4\,a\,b^3\,C\,x+\frac{\left(8\,A\,b^4+24\,a^2\,b^2\,(A+2\,C)+a^4\,(3\,A+4\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{8\,d}-\frac{b^2\,\left(2\,b^2\,(13\,A-12\,C)+3\,a^2\,(3\,A+4\,C)\right)\,\text{Sin}[c+d\,x]}{24\,d}+$$
$$\frac{a\,b\,\left(12\,A\,b^2+a^2\,(23\,A+36\,C)\right)\,\text{Tan}[c+d\,x]}{12\,d}+\frac{\left(4\,A\,b^2+a^2\,(3\,A+4\,C)\right)\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{8\,d}+$$
$$\frac{A\,b\,(a+b\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^4\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 612 leaves) :

$$\frac{4\,a\,b^3\,C\,(c+d\,x)}{d}+\frac{\left(-3\,a^4\,A-24\,a^2\,A\,b^2-8\,A\,b^4-4\,a^4\,C-48\,a^2\,b^2\,C\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{\left(3\,a^4\,A+24\,a^2\,A\,b^2+8\,A\,b^4+4\,a^4\,C+48\,a^2\,b^2\,C\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+$$
$$\frac{a^4\,A}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{9\,a^4\,A+16\,a^3\,A\,b+72\,a^2\,A\,b^2+12\,a^4\,C}{48\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{2\,a^3\,A\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{a^4\,A}{16\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{2\,a^3\,A\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+$$
$$\frac{-9\,a^4\,A-16\,a^3\,A\,b-72\,a^2\,A\,b^2-12\,a^4\,C}{48\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,\left(2\,a^3\,A\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a\,A\,b^3\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^3\,b\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+$$
$$\frac{4\,\left(2\,a^3\,A\,b\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a\,A\,b^3\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^3\,b\,C\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}{3\,d\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{b^4\,C\,\text{Sin}[c+d\,x]}{d}$$

- **Problem 566: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 88 leaves, 4 steps) :

$$\frac{C\,x}{b}-\frac{2\,\left(A\,b^2+a^2\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a\,\sqrt{a-b}\,b\,\sqrt{a+b}\,d}+\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a\,d}$$

Result (type 3, 234 leaves) :

$$\left(2\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\left(\left(a\,C\,d\,x-A\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+A\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]\right)\sqrt{-\left(a^2-b^2\right)(\mathrm{Cos}[c]-\mathrm{i}\,\mathrm{Sin}[c])^2}+2\left(A\,b^2+a^2\,C\right)\mathrm{ArcTan}\left[\frac{(\mathrm{i}\,\mathrm{Cos}[c]+\mathrm{Sin}[c])\left(b\,\mathrm{Sin}[c]+(-a+b\,\mathrm{Cos}[c])\,\mathrm{Tan}\left[\frac{d\,x}{2}\right]\right)}{\sqrt{-\left(a^2-b^2\right)(\mathrm{Cos}[c]-\mathrm{i}\,\mathrm{Sin}[c])^2}}\right](\mathrm{i}\,\mathrm{Cos}[c]+\mathrm{Sin}[c])\right)\right)\Big/\left(a\,b\,d\,(2\,A+C+C\,\mathrm{Cos}[2\,(c+d\,x)])\sqrt{\left(-a^2+b^2\right)(\mathrm{Cos}[2\,c]-\mathrm{i}\,\mathrm{Sin}[2\,c])}\right)$$

- **Problem 567: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^2}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 95 leaves, 5 steps):

$$\frac{2\left(A\,b^2+a^2\,C\right)\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^2\sqrt{a-b}\,\sqrt{a+b}\,d}-\frac{A\,b\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a^2\,d}+\frac{A\,\mathrm{Tan}[c+d\,x]}{a\,d}$$

Result (type 3, 306 leaves):

$$\left(2\,\mathrm{Cos}[c+d\,x]^2\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left(A\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-A\,b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\frac{2\,\mathrm{i}\left(A\,b^2+a^2\,C\right)\mathrm{ArcTan}\left[\frac{(\mathrm{i}\,\mathrm{Cos}[c]+\mathrm{Sin}[c])\left(b\,\mathrm{Sin}[c]+(-a+b\,\mathrm{Cos}[c])\,\mathrm{Tan}\left[\frac{d\,x}{2}\right]\right)}{\sqrt{-\left(a^2-b^2\right)(\mathrm{Cos}[c]-\mathrm{i}\,\mathrm{Sin}[c])^2}}\right](\mathrm{Cos}[c]-\mathrm{i}\,\mathrm{Sin}[c])}{\sqrt{\left(-a^2+b^2\right)(\mathrm{Cos}[c]-\mathrm{i}\,\mathrm{Sin}[c])^2}}+\frac{a\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+\frac{a\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)\right)\Big/\left(a^2\,d\,(2\,A+C+C\,\mathrm{Cos}[2\,(c+d\,x)])\right)$$

■ **Problem 568: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 137 leaves, 6 steps):

$$-\frac{2\,b\,\left(A\,b^2+a^2\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^3\,\sqrt{a-b}\,\sqrt{a+b}\,d}+\frac{\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^3\,d}-\frac{A\,b\,\text{Tan}[c+d\,x]}{a^2\,d}+\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 3, 399 leaves):

$$\frac{1}{2\,a^3\,d\,(2\,A+C+C\,\text{Cos}[2\,(c+d\,x)])}\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)$$
$$\left(-2\,\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+2\,\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$\frac{8\,b\,\left(A\,b^2+a^2\,C\right)\,\text{ArcTan}\left[\frac{(\mathrm{i}\,\text{Cos}[c]+\text{Sin}[c])\,\left(b\,\text{Sin}[c]+(-a+b\,\text{Cos}[c])\,\text{Tan}\left[\frac{d\,x}{2}\right]\right)}{\sqrt{-\left(a^2-b^2\right)\,(\text{Cos}[c]-\mathrm{i}\,\text{Sin}[c])^2}}\right]\,(\mathrm{i}\,\text{Cos}[c]+\text{Sin}[c])}{\sqrt{\left(-a^2+b^2\right)\,(\text{Cos}[c]-\mathrm{i}\,\text{Sin}[c])^2}}+$$
$$\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{4\,a\,A\,b\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}-$$
$$\left.\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{4\,a\,A\,b\,\text{Sin}\left[\frac{d\,x}{2}\right]}{\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}\right)$$

■ **Problem 569: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 184 leaves, 7 steps):

$$\frac{2\,b^2\left(A\,b^2+a^2\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^4\,\sqrt{a-b}\,\sqrt{a+b}\,d}-\frac{b\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^4\,d}+$$

$$\frac{\left(3\,A\,b^2+a^2\,(2\,A+3\,C)\right)\,\text{Tan}[c+d\,x]}{3\,a^3\,d}-\frac{A\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^2\,d}+\frac{A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,a\,d}$$

Result (type 3, 413 leaves):

$$\frac{1}{12\,a^4\,d}\left(-\frac{24\,b^2\left(A\,b^2+a^2\,C\right)\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{\sqrt{-a^2+b^2}}+6\,b\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\right.$$

$$6\,b\left(2\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{a^2\,A\,(a-3\,b)}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$

$$\frac{2\,a^3\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}+\frac{4\,a\left(3\,A\,b^2+a^2\,(2\,A+3\,C)\right)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}+$$

$$\left.\frac{2\,a^3\,A\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^3}-\frac{a^2\,A\,(a-3\,b)}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4\,a\left(3\,A\,b^2+a^2\,(2\,A+3\,C)\right)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}\right)$$

- **Problem 574: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 134 leaves, 5 steps):

$$-\frac{2\,b\left(2\,a^2\,A-A\,b^2+a^2\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^2\,(a-b)^{3/2}\,(a+b)^{3/2}\,d}+\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}+\frac{\left(A\,b^2+a^2\,C\right)\,\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 306 leaves):

$$\left(2\,\text{Cos}[c+d\,x]\,(C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\,\left(-A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.\right.$$

$$\frac{2\,b\,\left(-A\,b^2+a^2\,(2\,A+C)\right)\,\text{ArcTan}\left[\frac{(\mathrm{i}\,\text{Cos}[c]+\text{Sin}[c])\,\left(b\,\text{Sin}[c]+(-a+b\,\text{Cos}[c])\,\text{Tan}\left[\frac{d\,x}{2}\right]\right)}{\sqrt{-\left(a^2-b^2\right)\,(\text{Cos}[c]-\mathrm{i}\,\text{Sin}[c])^2}}\right]\,(\mathrm{i}\,\text{Cos}[c]+\text{Sin}[c])}{\left(a^2-b^2\right)\,\sqrt{\left(-a^2+b^2\right)\,(\text{Cos}[c]-\mathrm{i}\,\text{Sin}[c])^2}}+$$

$$\left.\left.\frac{a\,\left(A\,b^2+a^2\,C\right)\,(-a\,\text{Sin}[c]+b\,\text{Sin}[d\,x])}{(a-b)\,b\,(a+b)\,(a+b\,\text{Cos}[c+d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)}\right)\right)\Big/\left(a^2\,d\,(2\,A+C+C\,\text{Cos}[2\,(c+d\,x)])\right)$$

- **Problem 576: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 265 leaves, 7 steps):

$$-\frac{2\,b\,\left(4\,a^2\,A\,b^2-3\,A\,b^4+2\,a^4\,C-a^2\,b^2\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^4\,(a-b)^{3/2}\,(a+b)^{3/2}\,d}+\frac{\left(6\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^4\,d}+$$

$$\frac{b\,\left(3\,A\,b^2-a^2\,(2\,A-C)\right)\,\text{Tan}[c+d\,x]}{a^3\,\left(a^2-b^2\right)\,d}-\frac{\left(3\,A\,b^2-a^2\,(A-2\,C)\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^2\,\left(a^2-b^2\right)\,d}+\frac{\left(A\,b^2+a^2\,C\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 712 leaves):

$$\frac{4 b \left(4 a^2 A b^2 - 3 A b^4 + 2 a^4 C - a^2 b^2 C\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{-a^2+b^2}}\right] \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right)}{a^4 \left(a^2-b^2\right) \sqrt{-a^2+b^2}\; d \,(2 A + C + C \text{Cos}[2 c + 2 d x])} +$$

$$\frac{\left(-a^2 A - 6 A b^2 - 2 a^2 C\right) \text{Cos}[c+d x]^2 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right] - \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right] \left(C + A \text{Sec}[c+d x]^2\right)}{a^4 d \,(2 A + C + C \text{Cos}[2 c + 2 d x])} +$$

$$\frac{\left(a^2 A + 6 A b^2 + 2 a^2 C\right) \text{Cos}[c+d x]^2 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right] + \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right] \left(C + A \text{Sec}[c+d x]^2\right)}{a^4 d \,(2 A + C + C \text{Cos}[2 c + 2 d x])} +$$

$$\frac{A \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right)}{2 a^2 d \,(2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right] - \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2} - \frac{4 A b \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{a^3 d \,(2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right] - \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)} -$$

$$\frac{A \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right)}{2 a^2 d \,(2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right] + \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2} - \frac{4 A b \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{a^3 d \,(2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2}(c+d x)\right] + \text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)} +$$

$$\frac{2 \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \left(A b^4 \text{Sin}[c+d x] + a^2 b^2 C \text{Sin}[c+d x]\right)}{a^3 (a-b) (a+b) d \,(a + b \text{Cos}[c+d x]) (2 A + C + C \text{Cos}[2 c + 2 d x])}$$

- **Problem 582: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(A + C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{(a + b \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 211 leaves, 6 steps):

$$\frac{b \left(5 a^2 A b^2 - 2 A b^4 - 3 a^4 (2 A + C)\right) \text{ArcTan}\left[\frac{\sqrt{a-b}\, \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{a+b}}\right]}{a^3 (a-b)^{5/2} (a+b)^{5/2} d} +$$

$$\frac{A \text{ArcTanh}[\text{Sin}[c+d x]]}{a^3 d} + \frac{\left(A b^2 + a^2 C\right) \text{Sin}[c+d x]}{2 a \left(a^2-b^2\right) d \,(a + b \text{Cos}[c+d x])^2} - \frac{\left(2 A b^4 - a^4 C - a^2 b^2 (5 A + 2 C)\right) \text{Sin}[c+d x]}{2 a^2 \left(a^2-b^2\right)^2 d \,(a + b \text{Cos}[c+d x])}$$

Result (type 3, 409 leaves):

$$\frac{1}{2 a^3 d (2 A + C + C \operatorname{Cos}[2 (c + d x)])}$$

$$\operatorname{Cos}[c + d x] (C \operatorname{Cos}[c + d x] + A \operatorname{Sec}[c + d x]) \left(-4 A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] - \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 4 A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2} (c + d x)\right] + \operatorname{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \right.$$

$$\left(4 b \left(-5 a^2 A b^2 + 2 A b^4 + 3 a^4 (2 A + C)\right) \operatorname{ArcTan}\left[\frac{(\mathbb{i} \operatorname{Cos}[c] + \operatorname{Sin}[c]) \left(b \operatorname{Sin}[c] + (-a + b \operatorname{Cos}[c]) \operatorname{Tan}\left[\frac{d x}{2}\right]\right)}{\sqrt{-\left(a^2 - b^2\right) (\operatorname{Cos}[c] - \mathbb{i} \operatorname{Sin}[c])^2}}\right] (\mathbb{i} \operatorname{Cos}[c] + \operatorname{Sin}[c])\right) \Big/$$

$$\left(\left(a^2 - b^2\right)^2 \sqrt{\left(-a^2 + b^2\right) (\operatorname{Cos}[c] - \mathbb{i} \operatorname{Sin}[c])^2}\right) -$$

$$\left(a \operatorname{Sec}[c] \left(\left(2 a^2 + b^2\right) \left(-2 A b^4 + a^4 C + a^2 b^2 (5 A + 2 C)\right) \operatorname{Sin}[c] + b \left(-a \left(-7 A b^4 + 4 a^4 C + a^2 b^2 (16 A + 5 C)\right) \operatorname{Sin}[d x] + \right.\right.\right.$$

$$\left.\left.\left.\left. b \left(a b \left(-A b^2 + a^2 (4 A + 3 C)\right) \operatorname{Sin}[2 c + d x] - \left(-2 A b^4 + a^4 C + a^2 b^2 (5 A + 2 C)\right) \operatorname{Sin}[c + 2 d x]\right)\right)\right)\right) \Big/ \left(b \left(a^2 - b^2\right)^2 (a + b \operatorname{Cos}[c + d x])^2\right)\right)$$

## Problem 583: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^2}{(a + b \operatorname{Cos}[c + d x])^3} \, dx$$

Optimal (type 3, 275 leaves, 7 steps):

$$-\frac{\left(15 a^2 A b^4 - 6 A b^6 - 2 a^6 C - a^4 b^2 (12 A + C)\right) \operatorname{ArcTan}\left[\frac{\sqrt{a-b} \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{a^4 (a - b)^{5/2} (a + b)^{5/2} d} - \frac{3 A b \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{a^4 d} -$$

$$\frac{\left(11 a^2 A b^2 - 6 A b^4 - a^4 (2 A - 3 C)\right) \operatorname{Tan}[c + d x]}{2 a^3 \left(a^2 - b^2\right)^2 d} + \frac{\left(A b^2 + a^2 C\right) \operatorname{Tan}[c + d x]}{2 a \left(a^2 - b^2\right) d (a + b \operatorname{Cos}[c + d x])^2} - \frac{\left(3 A b^4 - 2 a^4 C - a^2 b^2 (6 A + C)\right) \operatorname{Tan}[c + d x]}{2 a^2 \left(a^2 - b^2\right)^2 d (a + b \operatorname{Cos}[c + d x])}$$

Result (type 3, 649 leaves):

$$-\left(2\left(12 a^4 A b^2-15 a^2 A b^4+6 A b^6+2 a^6 C+a^4 b^2 C\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{-a^2+b^2}}\right] \text{Cos}[c+d x]^2\left(C+A \text{Sec}[c+d x]^2\right)\right)\Big/$$

$$\left(a^4\left(a^2-b^2\right)^2 \sqrt{-a^2+b^2}\; d\,(2 A+C+C \text{Cos}[2 c+2 d x])\right)+\frac{6 A b \text{Cos}[c+d x]^2 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\left(C+A \text{Sec}[c+d x]^2\right)}{a^4 d\,(2 A+C+C \text{Cos}[2 c+2 d x])}-$$

$$\frac{6 A b \text{Cos}[c+d x]^2 \text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\left(C+A \text{Sec}[c+d x]^2\right)}{a^4 d\,(2 A+C+C \text{Cos}[2 c+2 d x])}+$$

$$\frac{2 A \text{Cos}[c+d x]^2\left(C+A \text{Sec}[c+d x]^2\right) \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{a^3 d\,(2 A+C+C \text{Cos}[2 c+2 d x])\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]-\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+\frac{2 A \text{Cos}[c+d x]^2\left(C+A \text{Sec}[c+d x]^2\right) \text{Sin}\left[\frac{1}{2}(c+d x)\right]}{a^3 d\,(2 A+C+C \text{Cos}[2 c+2 d x])\left(\text{Cos}\left[\frac{1}{2}(c+d x)\right]+\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)}+$$

$$\frac{\text{Cos}[c+d x]^2\left(C+A \text{Sec}[c+d x]^2\right)\left(-A b^3 \text{Sin}[c+d x]-a^2 b C \text{Sin}[c+d x]\right)}{a^2 (a-b) (a+b) d\,(a+b \text{Cos}[c+d x])^2 (2 A+C+C \text{Cos}[2 c+2 d x])}+$$

$$\frac{\text{Cos}[c+d x]^2\left(C+A \text{Sec}[c+d x]^2\right)\left(-7 a^2 A b^3 \text{Sin}[c+d x]+4 A b^5 \text{Sin}[c+d x]-3 a^4 b C \text{Sin}[c+d x]\right)}{a^3 (a-b)^2 (a+b)^2 d\,(a+b \text{Cos}[c+d x])(2 A+C+C \text{Cos}[2 c+2 d x])}$$

- **Problem 584: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3}{(a+b \text{Cos}[c+d x])^3}\, dx$$

Optimal (type 3, 378 leaves, 8 steps) :

$$-\frac{b\left(12 A b^6-a^2 b^4 (29 A-2 C)+5 a^4 b^2 (4 A-C)+6 a^6 C\right) \text{ArcTan}\left[\frac{\sqrt{a-b}\, \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{a+b}}\right]}{a^5 (a-b)^{5/2} (a+b)^{5/2} d}+\frac{\left(12 A b^2+a^2 (A+2 C)\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a^5 d}-$$

$$\frac{b\left(12 A b^4+a^4 (6 A-5 C)-a^2 b^2 (21 A-2 C)\right) \text{Tan}[c+d x]}{2 a^4\left(a^2-b^2\right)^2 d}+\frac{\left(6 A b^4+a^4 (A-4 C)-a^2 b^2 (10 A-C)\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a^3\left(a^2-b^2\right)^2 d}+$$

$$\frac{\left(A b^2+a^2 C\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a\left(a^2-b^2\right) d\,(a+b \text{Cos}[c+d x])^2}+\frac{\left(7 a^2 A b^2-4 A b^4+3 a^4 C\right) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a^2\left(a^2-b^2\right)^2 d\,(a+b \text{Cos}[c+d x])}$$

Result (type 3, 856 leaves) :

$$\left(2 b \left(20 a^4 A b^2 - 29 a^2 A b^4 + 12 A b^6 + 6 a^6 C - 5 a^4 b^2 C + 2 a^2 b^4 C\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{-a^2+b^2}}\right] \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right)\right) \Big/$$

$$\left(a^5 \left(a^2-b^2\right)^2 \sqrt{-a^2+b^2}\; d\; (2 A + C + C \text{Cos}[2 c + 2 d x])\right) +$$

$$\frac{\left(-a^2 A - 12 A b^2 - 2 a^2 C\right) \text{Cos}[c+d x]^2 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right] - \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right] \left(C + A \text{Sec}[c+d x]^2\right)}{a^5 d (2 A + C + C \text{Cos}[2 c + 2 d x])} +$$

$$\frac{\left(a^2 A + 12 A b^2 + 2 a^2 C\right) \text{Cos}[c+d x]^2 \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right] + \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right] \left(C + A \text{Sec}[c+d x]^2\right)}{a^5 d (2 A + C + C \text{Cos}[2 c + 2 d x])} +$$

$$\frac{A \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right)}{2 a^3 d (2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right] - \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} - \frac{6 A b \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{a^4 d (2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right] - \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)} -$$

$$\frac{A \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right)}{2 a^3 d (2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right] + \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2} - \frac{6 A b \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{a^4 d (2 A + C + C \text{Cos}[2 c + 2 d x]) \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right] + \text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)} +$$

$$\frac{\text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \left(A b^4 \text{Sin}[c+d x] + a^2 b^2 C \text{Sin}[c+d x]\right)}{a^3 (a-b) (a+b) d (a + b \text{Cos}[c+d x])^2 (2 A + C + C \text{Cos}[2 c + 2 d x])} +$$

$$\left(\text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \left(9 a^2 A b^4 \text{Sin}[c+d x] - 6 A b^6 \text{Sin}[c+d x] + 5 a^4 b^2 C \text{Sin}[c+d x] - 2 a^2 b^4 C \text{Sin}[c+d x]\right)\right) \Big/$$

$$\left(a^4 (a-b)^2 (a+b)^2 d (a + b \text{Cos}[c+d x]) (2 A + C + C \text{Cos}[2 c + 2 d x])\right)$$

## Problem 585: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[c+d x]^4 \left(A + C \text{Cos}[c+d x]^2\right)}{(a + b \text{Cos}[c+d x])^4} \, dx$$

Optimal (type 3, 514 leaves, 8 steps):

$$\frac{\left(2 A b^2 + \left(20 a^2 + b^2\right) C\right) x}{2 b^6} + \frac{\left(8 a A b^8 - a^7 b^2 (2 A - 69 C) + 7 a^5 b^4 (A - 12 C) - 8 a^3 b^6 (A - 5 C) - 20 a^9 C\right) \text{ArcTan}\left[\frac{\sqrt{a-b}\, \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{\sqrt{a-b}\; b^6 \sqrt{a+b} \left(a^2-b^2\right)^3 d} -$$

$$\frac{a \left(a^4 b^2 (6 A - 167 C) - a^2 b^4 (17 A - 146 C) + 2 b^6 (13 A - 12 C) + 60 a^6 C\right) \text{Sin}[c+d x]}{6 b^5 \left(a^2-b^2\right)^3 d} +$$

$$\frac{\left(a^4 b^2 (A - 27 C) - a^2 b^4 (2 A - 23 C) + b^6 (6 A - C) + 10 a^6 C\right) \text{Cos}[c+d x] \text{Sin}[c+d x]}{2 b^4 \left(a^2-b^2\right)^3 d} - \frac{\left(A b^2 + a^2 C\right) \text{Cos}[c+d x]^4 \text{Sin}[c+d x]}{3 b \left(a^2-b^2\right) d (a + b \text{Cos}[c+d x])^3} +$$

$$\frac{\left(4 A b^4 - 5 a^4 C + a^2 b^2 (A + 10 C)\right) \text{Cos}[c+d x]^3 \text{Sin}[c+d x]}{6 b^2 \left(a^2-b^2\right)^2 d (a + b \text{Cos}[c+d x])^2} - \frac{\left(12 A b^6 + a^4 b^2 (2 A - 53 C) + 20 a^6 C + a^2 b^4 (A + 48 C)\right) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{6 b^3 \left(a^2-b^2\right)^3 d (a + b \text{Cos}[c+d x])}$$

Result (type 3, 1452 leaves) :

$$\frac{1}{b^6\left(a^2-b^2\right)^3\sqrt{-a^2+b^2}\,d}a\left(2a^6Ab^2-7a^4Ab^4+8a^2Ab^6-8Ab^8+20a^8C-69a^6b^2C+84a^4b^4C-40a^2b^6C\right)\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{-a^2+b^2}}\right]-$$

$$\frac{1}{96b^6\left(-a^2+b^2\right)^3 d\,(a+b\,\text{Cos}[c+dx])^3}$$
$$\big(96a^9Ab^2(c+dx)-144a^7Ab^4(c+dx)-144a^5Ab^6(c+dx)+336a^3Ab^8(c+dx)-144aAb^{10}(c+dx)+960a^{11}C(c+dx)-$$
$$1392a^9b^2C(c+dx)-1512a^7b^4C(c+dx)+3288a^5b^6C(c+dx)-1272a^3b^8C(c+dx)-72ab^{10}C(c+dx)+288a^8Ab^3(c+dx)\text{Cos}[c+dx]-$$
$$792a^6Ab^5(c+dx)\text{Cos}[c+dx]+648a^4Ab^7(c+dx)\text{Cos}[c+dx]-72a^2Ab^9(c+dx)\text{Cos}[c+dx]-72Ab^{11}(c+dx)\text{Cos}[c+dx]+$$
$$2880a^{10}bC(c+dx)\text{Cos}[c+dx]-7776a^8b^3C(c+dx)\text{Cos}[c+dx]+6084a^6b^5C(c+dx)\text{Cos}[c+dx]-$$
$$396a^4b^7C(c+dx)\text{Cos}[c+dx]-756a^2b^9C(c+dx)\text{Cos}[c+dx]-36b^{11}C(c+dx)\text{Cos}[c+dx]+144a^7Ab^4(c+dx)\text{Cos}[2(c+dx)]-$$
$$432a^5Ab^6(c+dx)\text{Cos}[2(c+dx)]+432a^3Ab^8(c+dx)\text{Cos}[2(c+dx)]-144aAb^{10}(c+dx)\text{Cos}[2(c+dx)]+$$
$$1440a^9b^2C(c+dx)\text{Cos}[2(c+dx)]-4248a^7b^4C(c+dx)\text{Cos}[2(c+dx)]+4104a^5b^6C(c+dx)\text{Cos}[2(c+dx)]-$$
$$1224a^3b^8C(c+dx)\text{Cos}[2(c+dx)]-72ab^{10}C(c+dx)\text{Cos}[2(c+dx)]+24a^6Ab^5(c+dx)\text{Cos}[3(c+dx)]-$$
$$72a^4Ab^7(c+dx)\text{Cos}[3(c+dx)]+72a^2Ab^9(c+dx)\text{Cos}[3(c+dx)]-24Ab^{11}(c+dx)\text{Cos}[3(c+dx)]+$$
$$240a^8b^3C(c+dx)\text{Cos}[3(c+dx)]-708a^6b^5C(c+dx)\text{Cos}[3(c+dx)]+684a^4b^7C(c+dx)\text{Cos}[3(c+dx)]-$$
$$204a^2b^9C(c+dx)\text{Cos}[3(c+dx)]-12b^{11}C(c+dx)\text{Cos}[3(c+dx)]-96a^8Ab^3\text{Sin}[c+dx]+228a^6Ab^5\text{Sin}[c+dx]-$$
$$288a^4Ab^7\text{Sin}[c+dx]-144a^2Ab^9\text{Sin}[c+dx]-960a^{10}bC\,\text{Sin}[c+dx]+2232a^8b^3C\,\text{Sin}[c+dx]-1086a^6b^5C\,\text{Sin}[c+dx]-$$
$$750a^4b^7C\,\text{Sin}[c+dx]+270a^2b^9C\,\text{Sin}[c+dx]-6b^{11}C\,\text{Sin}[c+dx]-120a^7Ab^4\text{Sin}[2(c+dx)]+360a^5Ab^6\text{Sin}[2(c+dx)]-$$
$$480a^3Ab^8\text{Sin}[2(c+dx)]-1200a^9b^2C\,\text{Sin}[2(c+dx)]+3300a^7b^4C\,\text{Sin}[2(c+dx)]-2772a^5b^6C\,\text{Sin}[2(c+dx)]+$$
$$372a^3b^8C\,\text{Sin}[2(c+dx)]+60ab^{10}C\,\text{Sin}[2(c+dx)]-44a^6Ab^5\text{Sin}[3(c+dx)]+128a^4Ab^7\text{Sin}[3(c+dx)]-$$
$$144a^2Ab^9\text{Sin}[3(c+dx)]-440a^8b^3C\,\text{Sin}[3(c+dx)]+1253a^6b^5C\,\text{Sin}[3(c+dx)]-1143a^4b^7C\,\text{Sin}[3(c+dx)]+$$
$$279a^2b^9C\,\text{Sin}[3(c+dx)]-9b^{11}C\,\text{Sin}[3(c+dx)]-30a^7b^4C\,\text{Sin}[4(c+dx)]+90a^5b^6C\,\text{Sin}[4(c+dx)]-90a^3b^8C\,\text{Sin}[4(c+dx)]+$$
$$30ab^{10}C\,\text{Sin}[4(c+dx)]+3a^6b^5C\,\text{Sin}[5(c+dx)]-9a^4b^7C\,\text{Sin}[5(c+dx)]+9a^2b^9C\,\text{Sin}[5(c+dx)]-3b^{11}C\,\text{Sin}[5(c+dx)]\big)$$

- **Problem 586: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+dx]^3\left(A+C\,\text{Cos}[c+dx]^2\right)}{(a+b\,\text{Cos}[c+dx])^4}\,dx$$

Optimal (type 3, 369 leaves, 7 steps) :

$$-\frac{4aCx}{b^5}-\frac{\left(2Ab^8-8a^8C+28a^6b^2C-35a^4b^4C+a^2b^6(3A+20C)\right)\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{a+b}}\right]}{(a-b)^{7/2}b^5(a+b)^{7/2}d}-$$
$$\frac{\left(5Ab^4-\left(12a^4-23a^2b^2+6b^4\right)C\right)\text{Sin}[c+dx]}{6b^4\left(a^2-b^2\right)^2d}-\frac{\left(Ab^2+a^2C\right)\text{Cos}[c+dx]^3\,\text{Sin}[c+dx]}{3b\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+dx])^3}+$$
$$\frac{\left(3Ab^4-4a^4C+a^2b^2(2A+9C)\right)\text{Cos}[c+dx]^2\,\text{Sin}[c+dx]}{6b^2\left(a^2-b^2\right)^2d\,(a+b\,\text{Cos}[c+dx])^2}+\frac{a\left(2Ab^6+4a^6C-11a^4b^2C+3a^2b^4(A+4C)\right)\text{Sin}[c+dx]}{2b^4\left(a^2-b^2\right)^3d\,(a+b\,\text{Cos}[c+dx])}$$

Result (type 3, 893 leaves) :

$$-\frac{\left(-3 a^2 A b^6-2 A b^8+8 a^8 C-28 a^6 b^2 C+35 a^4 b^4 C-20 a^2 b^6 C\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{-a^2+b^2}}\right]}{b^5 \left(a^2-b^2\right)^3 \sqrt{-a^2+b^2}\, d}-$$

$$\frac{1}{24 b^5 \left(-a^2+b^2\right)^3 d (a+b \text{Cos}[c+d x])^3}\left(-96 a^{10} C (c+d x)+144 a^8 b^2 C (c+d x)+144 a^6 b^4 C (c+d x)-336 a^4 b^6 C (c+d x)+\right.$$
$$144 a^2 b^8 C (c+d x)-288 a^9 b C (c+d x) \text{Cos}[c+d x]+792 a^7 b^3 C (c+d x) \text{Cos}[c+d x]-648 a^5 b^5 C (c+d x) \text{Cos}[c+d x]+$$
$$72 a^3 b^7 C (c+d x) \text{Cos}[c+d x]+72 a b^9 C (c+d x) \text{Cos}[c+d x]-144 a^8 b^2 C (c+d x) \text{Cos}[2 (c+d x)]+432 a^6 b^4 C (c+d x) \text{Cos}[2 (c+d x)]-$$
$$432 a^4 b^6 C (c+d x) \text{Cos}[2 (c+d x)]+144 a^2 b^8 C (c+d x) \text{Cos}[2 (c+d x)]-24 a^7 b^3 C (c+d x) \text{Cos}[3 (c+d x)]+$$
$$72 a^5 b^5 C (c+d x) \text{Cos}[3 (c+d x)]-72 a^3 b^7 C (c+d x) \text{Cos}[3 (c+d x)]+24 a b^9 C (c+d x) \text{Cos}[3 (c+d x)]+18 a^5 A b^5 \text{Sin}[c+d x]+$$
$$39 a^3 A b^7 \text{Sin}[c+d x]+18 a A b^9 \text{Sin}[c+d x]+96 a^9 b C \text{Sin}[c+d x]-228 a^7 b^3 C \text{Sin}[c+d x]+135 a^5 b^5 C \text{Sin}[c+d x]+$$
$$90 a^3 b^7 C \text{Sin}[c+d x]-18 a b^9 C \text{Sin}[c+d x]+6 a^4 A b^6 \text{Sin}[2 (c+d x)]+54 a^2 A b^8 \text{Sin}[2 (c+d x)]+120 a^8 b^2 C \text{Sin}[2 (c+d x)]-$$
$$336 a^6 b^4 C \text{Sin}[2 (c+d x)]+300 a^4 b^6 C \text{Sin}[2 (c+d x)]-18 a^2 b^8 C \text{Sin}[2 (c+d x)]-6 b^{10} C \text{Sin}[2 (c+d x)]+2 a^5 A b^5 \text{Sin}[3 (c+d x)]-$$
$$5 a^3 A b^7 \text{Sin}[3 (c+d x)]+18 a A b^9 \text{Sin}[3 (c+d x)]+44 a^7 b^3 C \text{Sin}[3 (c+d x)]-125 a^5 b^5 C \text{Sin}[3 (c+d x)]+114 a^3 b^7 C \text{Sin}[3 (c+d x)]-$$
$$\left.18 a b^9 C \text{Sin}[3 (c+d x)]+3 a^6 b^4 C \text{Sin}[4 (c+d x)]-9 a^4 b^6 C \text{Sin}[4 (c+d x)]+9 a^2 b^8 C \text{Sin}[4 (c+d x)]-3 b^{10} C \text{Sin}[4 (c+d x)]\right)$$

- **Problem 587: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[c+d x]^2 \left(A+C \text{Cos}[c+d x]^2\right)}{(a+b \text{Cos}[c+d x])^4}\, dx$$

Optimal (type 3, 304 leaves, 6 steps):

$$\frac{C x}{b^4}+\frac{a \left(a^2 b^4 (A-8 C)-2 a^6 C+7 a^4 b^2 C+4 b^6 (A+2 C)\right) \text{ArcTan}\left[\frac{\sqrt{a-b}\, \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{a+b}}\right]}{(a-b)^{7/2} b^4 (a+b)^{7/2} d}-\frac{\left(A b^2+a^2 C\right) \text{Cos}[c+d x]^2 \text{Sin}[c+d x]}{3 b \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x])^3}-$$

$$\frac{a \left(2 A b^4-3 a^4 C+a^2 b^2 (3 A+8 C)\right) \text{Sin}[c+d x]}{6 b^3 \left(a^2-b^2\right)^2 d (a+b \text{Cos}[c+d x])^2}-\frac{\left(4 A b^6+9 a^6 C+2 a^2 b^4 (7 A+17 C)-a^4 b^2 (3 A+28 C)\right) \text{Sin}[c+d x]}{6 b^3 \left(a^2-b^2\right)^3 d (a+b \text{Cos}[c+d x])}$$

Result (type 3, 773 leaves):

$$\frac{a\left(-a^2 A b^4-4 A b^6+2 a^6 C-7 a^4 b^2 C+8 a^2 b^4 C-8 b^6 C\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{-a^2+b^2}}\right]}{b^4\left(a^2-b^2\right)^3 \sqrt{-a^2+b^2}\, d}+$$

$$\frac{1}{24 b^4\left(-a^2+b^2\right)^3 d\,(a+b \text{Cos}[c+d x])^3}\Big(-24 a^9 C(c+d x)+36 a^7 b^2 C(c+d x)+36 a^5 b^4 C(c+d x)-84 a^3 b^6 C(c+d x)+36 a b^8 C(c+d x)-$$
$$72 a^8 b C(c+d x) \text{Cos}[c+d x]+198 a^6 b^3 C(c+d x) \text{Cos}[c+d x]-162 a^4 b^5 C(c+d x) \text{Cos}[c+d x]+18 a^2 b^7 C(c+d x) \text{Cos}[c+d x]+$$
$$18 b^9 C(c+d x) \text{Cos}[c+d x]-36 a^7 b^2 C(c+d x) \text{Cos}[2(c+d x)]+108 a^5 b^4 C(c+d x) \text{Cos}[2(c+d x)]-108 a^3 b^6 C(c+d x) \text{Cos}[2(c+d x)]+$$
$$36 a b^8 C(c+d x) \text{Cos}[2(c+d x)]-6 a^6 b^3 C(c+d x) \text{Cos}[3(c+d x)]+18 a^4 b^5 C(c+d x) \text{Cos}[3(c+d x)]-18 a^2 b^7 C(c+d x) \text{Cos}[3(c+d x)]+$$
$$6 b^9 C(c+d x) \text{Cos}[3(c+d x)]+51 a^4 A b^5 \text{Sin}[c+d x]+18 a^2 A b^7 \text{Sin}[c+d x]+6 A b^9 \text{Sin}[c+d x]+24 a^8 b C \text{Sin}[c+d x]-$$
$$57 a^6 b^3 C \text{Sin}[c+d x]+72 a^4 b^5 C \text{Sin}[c+d x]+36 a^2 b^7 C \text{Sin}[c+d x]-6 a^5 A b^4 \text{Sin}[2(c+d x)]+54 a^3 A b^6 \text{Sin}[2(c+d x)]+$$
$$12 a A b^8 \text{Sin}[2(c+d x)]+30 a^7 b^2 C \text{Sin}[2(c+d x)]-90 a^5 b^4 C \text{Sin}[2(c+d x)]+120 a^3 b^6 C \text{Sin}[2(c+d x)]-a^4 A b^5 \text{Sin}[3(c+d x)]+$$
$$10 a^2 A b^7 \text{Sin}[3(c+d x)]+6 A b^9 \text{Sin}[3(c+d x)]+11 a^6 b^3 C \text{Sin}[3(c+d x)]-32 a^4 b^5 C \text{Sin}[3(c+d x)]+36 a^2 b^7 C \text{Sin}[3(c+d x)]\Big)$$

- **Problem 590: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{(a+b \text{Cos}[c+d x])^4}\, dx$$

Optimal (type 3, 301 leaves, 7 steps):

$$-\frac{b\left(7 a^2 A b^4-2 A b^6-a^4 b^2(8 A-C)+4 a^6(2 A+C)\right) \text{ArcTan}\left[\frac{\sqrt{a-b}\, \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{a+b}}\right]}{a^4(a-b)^{7/2}(a+b)^{7/2} d}+\frac{A \text{ArcTanh}[\text{Sin}[c+d x]]}{a^4 d}+$$
$$\frac{\left(A b^2+a^2 C\right) \text{Sin}[c+d x]}{3 a\left(a^2-b^2\right) d\,(a+b \text{Cos}[c+d x])^3}-\frac{\left(3 A b^4-2 a^4 C-a^2 b^2(8 A+3 C)\right) \text{Sin}[c+d x]}{6 a^2\left(a^2-b^2\right)^2 d\,(a+b \text{Cos}[c+d x])^2}-\frac{\left(17 a^2 A b^4-6 A b^6-2 a^6 C-13 a^4 b^2(2 A+C)\right) \text{Sin}[c+d x]}{6 a^3\left(a^2-b^2\right)^3 d\,(a+b \text{Cos}[c+d x])}$$

Result (type 3, 1088 leaves):

$$-\frac{2\,A\,Cos[c+d\,x]\,Log\left[Cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]-Sin\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(C\,Cos[c+d\,x]+A\,Sec[c+d\,x])}{a^4\,d\,(2\,A+C+C\,Cos[2\,c+2\,d\,x])}+$$

$$\frac{2\,A\,Cos[c+d\,x]\,Log\left[Cos\left[\frac{c}{2}+\frac{d\,x}{2}\right]+Sin\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(C\,Cos[c+d\,x]+A\,Sec[c+d\,x])}{a^4\,d\,(2\,A+C+C\,Cos[2\,c+2\,d\,x])}+$$

$$\frac{1}{\left(a^2-b^2\right)^3\,(2\,A+C+C\,Cos[2\,c+2\,d\,x])}\left(8\,a^6\,A-8\,a^4\,A\,b^2+7\,a^2\,A\,b^4-2\,A\,b^6+4\,a^6\,C+a^4\,b^2\,C\right)\,Cos[c+d\,x]$$

$$(C\,Cos[c+d\,x]+A\,Sec[c+d\,x])\left(\left(2\,i\,b\,ArcTan\left[Sec\left[\frac{d\,x}{2}\right]\left(\frac{Cos[c]}{\sqrt{-a^2\,Cos[2\,c]+b^2\,Cos[2\,c]+i\,a^2\,Sin[2\,c]-i\,b^2\,Sin[2\,c]}}-\right.\right.\right.\right.$$

$$\left.\frac{i\,Sin[c]}{\sqrt{-a^2\,Cos[2\,c]+b^2\,Cos[2\,c]+i\,a^2\,Sin[2\,c]-i\,b^2\,Sin[2\,c]}}\right)\left(-i\,a\,Sin\left[\frac{d\,x}{2}\right]+i\,b\,Sin\left[c+\frac{d\,x}{2}\right]\right)\Bigg]\,Cos[c]\Bigg)\Bigg/$$

$$\left(a^4\,d\,\sqrt{-a^2\,Cos[2\,c]+b^2\,Cos[2\,c]+i\,a^2\,Sin[2\,c]-i\,b^2\,Sin[2\,c]}\right)+\left(2\,b\,ArcTan\left[Sec\left[\frac{d\,x}{2}\right]\right.\right.$$

$$\left(\frac{Cos[c]}{\sqrt{-a^2\,Cos[2\,c]+b^2\,Cos[2\,c]+i\,a^2\,Sin[2\,c]-i\,b^2\,Sin[2\,c]}}-\frac{i\,Sin[c]}{\sqrt{-a^2\,Cos[2\,c]+b^2\,Cos[2\,c]+i\,a^2\,Sin[2\,c]-i\,b^2\,Sin[2\,c]}}\right)$$

$$\left.\left.\left(-i\,a\,Sin\left[\frac{d\,x}{2}\right]+i\,b\,Sin\left[c+\frac{d\,x}{2}\right]\right)\right]\,Sin[c]\right)\Bigg/\left(a^4\,d\,\sqrt{-a^2\,Cos[2\,c]+b^2\,Cos[2\,c]+i\,a^2\,Sin[2\,c]-i\,b^2\,Sin[2\,c]}\right)\Bigg)-$$

$$\left(2\,Cos[c+d\,x]\,Sec[c]\,(C\,Cos[c+d\,x]+A\,Sec[c+d\,x])\left(a\,A\,b^2\,Sin[c]+a^3\,C\,Sin[c]-A\,b^3\,Sin[d\,x]-a^2\,b\,C\,Sin[d\,x]\right)\right)\Big/$$
$$\left(3\,a\,b\,\left(a^2-b^2\right)\,d\,(a+b\,Cos[c+d\,x])^3\,(2\,A+C+C\,Cos[2\,c+2\,d\,x])\right)+$$
$$\Big(Cos[c+d\,x]\,Sec[c]\,(C\,Cos[c+d\,x]+A\,Sec[c+d\,x])$$
$$\left(-6\,a^3\,A\,b\,Sin[c]+a\,A\,b^3\,Sin[c]-5\,a^3\,b\,C\,Sin[c]+8\,a^2\,A\,b^2\,Sin[d\,x]-3\,A\,b^4\,Sin[d\,x]+2\,a^4\,C\,Sin[d\,x]+3\,a^2\,b^2\,C\,Sin[d\,x]\right)\Big)\Big/$$
$$\left(3\,a^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,Cos[c+d\,x])^2\,(2\,A+C+C\,Cos[2\,c+2\,d\,x])\right)+$$
$$\Big(Cos[c+d\,x]\,Sec[c]\,(C\,Cos[c+d\,x]+A\,Sec[c+d\,x])\,\big(-18\,a^5\,A\,b\,Sin[c]+6\,a^3\,A\,b^3\,Sin[c]-3\,a\,A\,b^5\,Sin[c]-12\,a^5\,b\,C\,Sin[c]-$$
$$3\,a^3\,b^3\,C\,Sin[c]+26\,a^4\,A\,b^2\,Sin[d\,x]-17\,a^2\,A\,b^4\,Sin[d\,x]+6\,A\,b^6\,Sin[d\,x]+2\,a^6\,C\,Sin[d\,x]+13\,a^4\,b^2\,C\,Sin[d\,x]\big)\Big)\Big/$$
$$\left(3\,a^3\,\left(a^2-b^2\right)^3\,d\,(a+b\,Cos[c+d\,x])\,(2\,A+C+C\,Cos[2\,c+2\,d\,x])\right)$$

- **Problem 592: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,Cos[c+d\,x]^2\right)\,Sec[c+d\,x]^3}{(a+b\,Cos[c+d\,x])^4}\,dx$$

Optimal (type 3, 522 leaves, 9 steps) :

$$\frac{\left(20\,A\,b^9-a^2\,b^7\,(69\,A-2\,C)-8\,a^6\,b^3\,(5\,A-C)+7\,a^4\,b^5\,(12\,A-C)-8\,a^8\,b\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^6\,\sqrt{a-b}\,\sqrt{a+b}\,\left(a^2-b^2\right)^3\,d}+$$

$$\frac{\left(20\,A\,b^2+a^2\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,a^6\,d}+\frac{b\,\left(60\,A\,b^6-a^6\,(24\,A-26\,C)+a^4\,b^2\,(146\,A-17\,C)-a^2\,b^4\,(167\,A-6\,C)\right)\,\text{Tan}[c+d\,x]}{6\,a^5\,\left(a^2-b^2\right)^3\,d}-$$

$$\frac{\left(10\,A\,b^6-a^6\,(A-6\,C)+a^4\,b^2\,(23\,A-2\,C)-a^2\,b^4\,(27\,A-C)\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^4\,\left(a^2-b^2\right)^3\,d}+\frac{\left(A\,b^2+a^2\,C\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^3}-$$

$$\frac{\left(5\,A\,b^4-4\,a^4\,C-a^2\,b^2\,(10\,A+C)\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{6\,a^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{\left(20\,A\,b^6-a^2\,b^4\,(53\,A-2\,C)+12\,a^6\,C+a^4\,b^2\,(48\,A+C)\right)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{6\,a^3\,\left(a^2-b^2\right)^3\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 1065 leaves) :

$$\left(2\,b\,\left(40\,a^6\,A\,b^2-84\,a^4\,A\,b^4+69\,a^2\,A\,b^6-20\,A\,b^8+8\,a^8\,C-8\,a^6\,b^2\,C+7\,a^4\,b^4\,C-2\,a^2\,b^6\,C\right)\right.$$
$$\left.\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]\,\text{Cos}[c+d\,x]^2\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)\right)\Big/\left(a^6\,\left(a^2-b^2\right)^3\,\sqrt{-a^2+b^2}\,d\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])\right)+$$

$$\frac{\left(-a^2\,A-20\,A\,b^2-2\,a^2\,C\right)\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{a^6\,d\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{\left(a^2\,A+20\,A\,b^2+2\,a^2\,C\right)\,\text{Cos}[c+d\,x]^2\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]\,\left(C+A\,\text{Sec}[c+d\,x]^2\right)}{a^6\,d\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{1}{48\,a^5\,\left(a^2-b^2\right)^3\,d\,(a+b\,\text{Cos}[c+d\,x])^3\,(2\,A+C+C\,\text{Cos}[2\,c+2\,d\,x])}$$
$$\left(C+A\,\text{Sec}[c+d\,x]^2\right)\,\left(48\,a^{10}\,A\,\text{Sin}[c+d\,x]-396\,a^8\,A\,b^2\,\text{Sin}[c+d\,x]+1212\,a^6\,A\,b^4\,\text{Sin}[c+d\,x]-1000\,a^4\,A\,b^6\,\text{Sin}[c+d\,x]+106\,a^2\,A\,b^8\,\text{Sin}[c+d\,x]+\right.$$
$$120\,A\,b^{10}\,\text{Sin}[c+d\,x]+144\,a^8\,b^2\,C\,\text{Sin}[c+d\,x]-76\,a^6\,b^4\,C\,\text{Sin}[c+d\,x]+10\,a^4\,b^6\,C\,\text{Sin}[c+d\,x]+12\,a^2\,b^8\,C\,\text{Sin}[c+d\,x]-$$
$$120\,a^9\,A\,b\,\text{Sin}[2\,(c+d\,x)]+84\,a^7\,A\,b^3\,\text{Sin}[2\,(c+d\,x)]+1116\,a^5\,A\,b^5\,\text{Sin}[2\,(c+d\,x)]-1560\,a^3\,A\,b^7\,\text{Sin}[2\,(c+d\,x)]+$$
$$600\,a\,A\,b^9\,\text{Sin}[2\,(c+d\,x)]+240\,a^7\,b^3\,C\,\text{Sin}[2\,(c+d\,x)]-180\,a^5\,b^5\,C\,\text{Sin}[2\,(c+d\,x)]+60\,a^3\,b^7\,C\,\text{Sin}[2\,(c+d\,x)]-$$
$$252\,a^8\,A\,b^2\,\text{Sin}[3\,(c+d\,x)]+1044\,a^6\,A\,b^4\,\text{Sin}[3\,(c+d\,x)]-806\,a^4\,A\,b^6\,\text{Sin}[3\,(c+d\,x)]-61\,a^2\,A\,b^8\,\text{Sin}[3\,(c+d\,x)]+$$
$$180\,A\,b^{10}\,\text{Sin}[3\,(c+d\,x)]+144\,a^8\,b^2\,C\,\text{Sin}[3\,(c+d\,x)]-50\,a^6\,b^4\,C\,\text{Sin}[3\,(c+d\,x)]-7\,a^4\,b^6\,C\,\text{Sin}[3\,(c+d\,x)]+18\,a^2\,b^8\,C\,\text{Sin}[3\,(c+d\,x)]-$$
$$138\,a^7\,A\,b^3\,\text{Sin}[4\,(c+d\,x)]+738\,a^5\,A\,b^5\,\text{Sin}[4\,(c+d\,x)]-840\,a^3\,A\,b^7\,\text{Sin}[4\,(c+d\,x)]+300\,a\,A\,b^9\,\text{Sin}[4\,(c+d\,x)]+$$
$$120\,a^7\,b^3\,C\,\text{Sin}[4\,(c+d\,x)]-90\,a^5\,b^5\,C\,\text{Sin}[4\,(c+d\,x)]+30\,a^3\,b^7\,C\,\text{Sin}[4\,(c+d\,x)]-24\,a^6\,A\,b^4\,\text{Sin}[5\,(c+d\,x)]+146\,a^4\,A\,b^6\,\text{Sin}[5\,(c+d\,x)]-$$
$$\left.167\,a^2\,A\,b^8\,\text{Sin}[5\,(c+d\,x)]+60\,A\,b^{10}\,\text{Sin}[5\,(c+d\,x)]+26\,a^6\,b^4\,C\,\text{Sin}[5\,(c+d\,x)]-17\,a^4\,b^6\,C\,\text{Sin}[5\,(c+d\,x)]+6\,a^2\,b^8\,C\,\text{Sin}[5\,(c+d\,x)]\right)$$

### Problem 599: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(1-\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 117 leaves, 6 steps):

$$\frac{2\sqrt{a-b}\;b\sqrt{a+b}\;\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^3\,d}-\frac{\left(a^2-2\,b^2\right)\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a^3\,d}-\frac{b\,\mathrm{Tan}[c+d\,x]}{a^2\,d}+\frac{\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 3, 236 leaves):

$$\frac{1}{4\,a^3\,d}\left(8\,b\sqrt{-a^2+b^2}\;\mathrm{ArcTanh}\left[\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]+2\,a^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\right.$$
$$4\,b^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-2\,a^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+4\,b^2\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+$$
$$\left.\frac{a^2}{\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{a^2}{\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-4\,a\,b\,\mathrm{Tan}[c+d\,x]\right)$$

### Problem 609: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(1-\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^4}{(a+b\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 195 leaves, 8 steps):

$$-\frac{2\,b^2\left(3\,a^2-4\,b^2\right)\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^5\sqrt{a-b}\;\sqrt{a+b}\;d}+\frac{b\left(a^2-4\,b^2\right)\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a^5\,d}-$$
$$\frac{\left(a^2-12\,b^2\right)\mathrm{Tan}[c+d\,x]}{3\,a^4\,d}-\frac{2\,b\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{a^3\,d}+\frac{4\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,a^2\,d}-\frac{\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{a\,d\,(a+b\,\mathrm{Cos}[c+d\,x])}$$

Result (type 3, 475 leaves):

$$\frac{2\,b^2\left(3\,a^2-4\,b^2\right)\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{a^5\,\sqrt{-a^2+b^2}\,d}+\frac{\left(-a^2\,b+4\,b^3\right)\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{a^5\,d}+$$

$$\frac{\left(a^2\,b-4\,b^3\right)\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{a^5\,d}+\frac{a-6\,b}{12\,a^3\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,a^2\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,a^2\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{-a+6\,b}{12\,a^3\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{-a^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,b^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,a^4\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{-a^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,b^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,a^4\,d\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{b^3\,\text{Sin}[c+d\,x]}{a^4\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

- **Problem 626: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]\,dx$$

Optimal (type 4, 231 leaves, 9 steps):

$$\frac{2\,a\,C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{3\,b\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-\frac{2\left(a^2\,C-b^2\,(3\,A+C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{3\,b\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,a\,A\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 371 leaves):

$$\frac{1}{6\,d}\left(\frac{4\,b\,(3\,A+C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,a\,(6\,A+C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{b^2\,\sqrt{-\frac{1}{a+b}}}2\,\mathrm{i}\,C\,\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\,\sqrt{\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{-a+b}}\;\mathrm{Csc}[c+d\,x]$$

$$\left(-2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(-2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]+b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)+4\,C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]\right)$$

## Problem 627: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 205 leaves, 9 steps):

$$-\frac{(A-2\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{a\,A\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 4, 374 leaves):

$$\frac{1}{4\,d}\left(\frac{8\,a\,C\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}+\frac{2\,b\,(A+2\,C)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}-\right.$$

$$\frac{1}{a\,b\,\sqrt{-\frac{1}{a+b}}}2\,i\,(A-2\,C)\,\sqrt{-\frac{b\,(-1+Cos[c+d\,x])}{a+b}}\,\sqrt{\frac{b\,(1+Cos[c+d\,x])}{-a+b}}\;Csc[c+d\,x]$$

$$\left(-2\,a\,(a-b)\,EllipticE\left[i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(-2\,a\,EllipticF\left[i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]+b\,EllipticPi\left[\frac{a+b}{a},\,i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)+4\,A\,\sqrt{a+b\,Cos[c+d\,x]}\;Tan[c+d\,x]\right)$$

- **Problem 628: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,Cos[c+d\,x]}\,\left(A+C\,Cos[c+d\,x]^2\right)\,Sec[c+d\,x]^3\,dx$$

Optimal (type 4, 277 leaves, 10 steps):

$$-\frac{A\,b\,\sqrt{a+b\,Cos[c+d\,x]}\;EllipticE\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a\,d\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}}+$$

$$\frac{b\,(3\,A+8\,C)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,Cos[c+d\,x]}}-\frac{\left(A\,b^2-4\,a^2\,(A+2\,C)\right)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a\,d\,\sqrt{a+b\,Cos[c+d\,x]}}+$$

$$\frac{A\,b\,\sqrt{a+b\,Cos[c+d\,x]}\;Tan[c+d\,x]}{4\,a\,d}+\frac{A\,\sqrt{a+b\,Cos[c+d\,x]}\;Sec[c+d\,x]\;Tan[c+d\,x]}{2\,d}$$

Result (type 4, 535 leaves):

$$\frac{1}{16\,a\,d}\left(\frac{2\,(4\,a\,A\,b+16\,a\,b\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(8\,a^2\,A-3\,A\,b^2+16\,a^2\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\left(2\,\mathrm{i}\,A\,b^2\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{A\,b\,\mathrm{Tan}[c+d\,x]}{4\,a}+\frac{1}{2}\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]\right)}{d}$$

- **Problem 629: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 365 leaves, 11 steps):

$$\frac{\left(3\,A\,b^2-8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,a^2\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-\frac{\left(A\,b^2-8\,a^2\,(2\,A+3\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{b\,\left(A\,b^2+4\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{8\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{\left(3\,A\,b^2-8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{24\,a^2\,d}+$$

$$\frac{A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\;\text{Tan}[c+d\,x]}{12\,a\,d}+\frac{A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 4, 601 leaves) :

$$-\frac{1}{96 a^2 d} b \left(-\frac{8 a A b \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2\left(-8 a^2 A-9 A b^2-24 a^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\right.$$

$$\left(2 i\left(16 a^2 A-3 A b^2+24 a^2 C\right) \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2(c+d x)]\right.$$

$$\left(2 a(a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b\left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\right) \Big/$$

$$\left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2} \sqrt{-\frac{a^2-b^2-2 a(a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}}\right.$$

$$\left.\left.\left(2 a^2-b^2-4 a(a+b \operatorname{Cos}[c+d x])+2(a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d} \sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{\operatorname{Sec}[c+d x]\left(16 a^2 A \operatorname{Sin}[c+d x]-3 A b^2 \operatorname{Sin}[c+d x]+24 a^2 C \operatorname{Sin}[c+d x]\right)}{24 a^2}+\right.$$

$$\frac{A b \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 a}+$$

$$\left.\frac{1}{3} A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\right)$$

- **Problem 633: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b \operatorname{Cos}[c+d x])^{3/2}\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x] \, dx$$

Optimal (type 4, 281 leaves, 10 steps):

$$\frac{2\left(a^2 C+b^2 (5 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{5 b d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{2 a \left(5 A b^2-\left(a^2-b^2\right) C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{5 b d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{2 a^2 A \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2 a C \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sin}[c+d x]}{5 d}+\frac{2 C (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sin}[c+d x]}{5 d}$$

Result (type 4, 421 leaves) :

$$\frac{1}{10 d}$$

$$\left(\frac{8 a b (5 A+2 C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2\left(a^2 (10 A+C)+b^2 (5 A+3 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\right.$$

$$\frac{1}{a b^2 \sqrt{-\frac{1}{a+b}}} 2 \, i \left(5 A b^2+\left(a^2+3 b^2\right) C\right) \sqrt{-\frac{b(-1+\operatorname{Cos}[c+d x])}{a+b}} \sqrt{\frac{b(1+\operatorname{Cos}[c+d x])}{-a+b}}\ \operatorname{Csc}[c+d x] \left(-2 a (a-b)\right.$$

$$\operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b \left(-2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+\right.$$

$$\left.\left.\left. b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right)+4 C \sqrt{a+b \operatorname{Cos}[c+d x]}\ (2 a+b \operatorname{Cos}[c+d x]) \operatorname{Sin}[c+d x]\right)$$

- **Problem 634: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b \operatorname{Cos}[c+d x])^{3/2} \left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^2 \, dx$$

Optimal (type 4, 270 leaves, 10 steps) :

$$-\frac{a\,(3A-8C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2b}{a+b}\right]}{3\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{\left(a^2\,(3A-2C)+2\,b^2\,(3A+C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2b}{a+b}\right]}{3\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{3\,a\,A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{b\,(3A-2C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,d}+\frac{A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 4, 528 leaves) :

$$\frac{1}{12\,d}$$

$$\left(\frac{2\left(12\,A\,b^2+12\,a^2\,C+4\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,(15\,a\,A\,b+8\,a\,b\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,\mathrm{i}\,(-3\,a\,A\,b+8\,a\,b\,C)\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{2}{3}\,b\,C\,\mathrm{Sin}[c+d\,x]+a\,A\,\mathrm{Tan}[c+d\,x]\right)}{d}$$

- **Problem 635: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 276 leaves, 10 steps) :

$$-\frac{b\,(5\,A-8\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{a\,b\,(7\,A+8\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\left(3\,A\,b^2+4\,a^2\,(A+2\,C)\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{3\,A\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 544 leaves) :

$$\frac{1}{16\,d}\left(\frac{2\,(4\,a\,A\,b+32\,a\,b\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\ \frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(8\,a^2\,A+A\,b^2+16\,a^2\,C+8\,b^2\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\ \frac{1}{2}\,(c+d\,x),\ \frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-5\,A\,b^2+8\,b^2\,C\right)\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\ \text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\ \frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\ \mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\ \frac{a+b}{a-b}\right]\right)\right)\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{5}{4}\,A\,b\,\text{Tan}[c+d\,x]+\frac{1}{2}\,a\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 636: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 365 leaves, 11 steps):

$$-\frac{\left(3\,A\,b^2+8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,a\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(8\,a^2\,(2\,A+3\,C)+b^2\,(17\,A+48\,C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{b\,\left(A\,b^2-12\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{8\,a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\left(3\,A\,b^2+8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{24\,a\,d}+$$

$$\frac{A\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]\;\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,d}$$

Result (type 4, 607 leaves) :

$$-\frac{1}{96\,a\,d}\,b\left(\frac{2\,(-28\,a\,A\,b-96\,a\,b\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(-56\,a^2\,A+9\,A\,b^2-120\,a^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\left(16\,a^2\,A+3\,A\,b^2+24\,a^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\;\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{\mathrm{Sec}[c+d\,x]\,\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]+3\,A\,b^2\,\mathrm{Sin}[c+d\,x]+24\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{24\,a}+\right.$$

$$\frac{7}{12}\,A\,b\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]+$$

$$\left.\frac{1}{3}\,a\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 637: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 4, 436 leaves, 12 steps) :

$$\frac{b\left(3\,A\,b^2-4\,a^2\,(13\,A+20\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{64\,a^2\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{b\left(A\,b^2-4\,a^2\,(19\,A+28\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{64\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(3\,A\,b^4+24\,a^2\,b^2\,(A+2\,C)+16\,a^4\,(3\,A+4\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{64\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{b\left(3\,A\,b^2-4\,a^2\,(13\,A+20\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Tan}[c+d\,x]}{64\,a^2\,d}+\frac{\left(A\,b^2+4\,a^2\,(3\,A+4\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]\ \text{Tan}[c+d\,x]}{32\,a\,d}+$$

$$\frac{A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^2\ \text{Tan}[c+d\,x]}{8\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\ \text{Sec}[c+d\,x]^3\ \text{Tan}[c+d\,x]}{4\,d}$$

Result (type 4, 696 leaves) :

$$\frac{1}{256\,a^2\,d}\left(\frac{2\,\left(48\,a^3\,A\,b+4\,a\,A\,b^3+64\,a^3\,b\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(96\,a^4\,A-4\,a^2\,A\,b^2+9\,A\,b^4+128\,a^4\,C+16\,a^2\,b^2\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-52\,a^2\,A\,b^2+3\,A\,b^4-80\,a^2\,b^2\,C\right)\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\,\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\text{Sin}[c+d\,x]\right)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{\text{Sec}[c+d\,x]^2\,\left(12\,a^2\,A\,\text{Sin}[c+d\,x]+A\,b^2\,\text{Sin}[c+d\,x]+16\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{32\,a}+\right.$$

$$\frac{\text{Sec}[c+d\,x]\,\left(52\,a^2\,A\,b\,\text{Sin}[c+d\,x]-3\,A\,b^3\,\text{Sin}[c+d\,x]+80\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{64\,a^2}+$$

$$\left.\frac{3}{8}\,A\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\frac{1}{4}\,a\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 641: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]\,\mathrm{d}x$$

Optimal (type 4, 342 leaves, 11 steps):

$$\frac{2\,a\,\left(49\,A\,b^2+3\,a^2\,C+29\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{21\,b\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{2\,\left(2\,a^2\,b^2\,(7\,A-C)-3\,a^4\,C+b^4\,(7\,A+5\,C)\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{21\,b\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,a^3\,A\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,\left(3\,a^2\,C+b^2\,(7\,A+5\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,C\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{7\,d}+\frac{2\,C\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 4, 468 leaves) :

$$\frac{1}{42\,d}\left(\frac{4\,b\,\left(9\,a^2\,(7\,A+3\,C)+b^2\,(7\,A+5\,C)\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,a\,\left(3\,a^2\,(14\,A+C)+b^2\,(49\,A+29\,C)\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\,\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{1}{b^2\,\sqrt{-\frac{1}{a+b}}}$$

$$2\,\text{i}\,\left(49\,A\,b^2+3\,a^2\,C+29\,b^2\,C\right)\,\sqrt{-\frac{b\,(-1+\text{Cos}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{b\,(1+\text{Cos}[c+d\,x])}{-a+b}}\,\,\text{Csc}[c+d\,x]$$

$$\left(-2\,a\,(a-b)\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\right],\,\frac{a+b}{a-b}\right]+b\,\left(-2\,a\,\text{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.\left.\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\right],\,\frac{a+b}{a-b}\right]+b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\right],\,\frac{a+b}{a-b}\right]\right)\right)+$$

$$\left.2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\left(14\,A\,b^2+18\,a^2\,C+13\,b^2\,C+18\,a\,b\,C\,\text{Cos}[c+d\,x]+3\,b^2\,C\,\text{Cos}[2\,(c+d\,x)]\right)\,\text{Sin}[c+d\,x]\right)$$

■ **Problem 642: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 327 leaves, 11 steps):

$$-\frac{\left(a^2\,(15\,A-46\,C)-6\,b^2\,(5\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{a\left(a^2\,(15\,A-16\,C)+4\,b^2\,(15\,A+4\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{5\,a^2\,A\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{a\,b\,(15\,A-16\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{15\,d}-\frac{b\,(5\,A-2\,C)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Tan}[c+d\,x]}{d}$$

Result (type 4, 581 leaves):

$$\frac{1}{60\,d}\left(\frac{2\left(180\,a\,A\,b^2+60\,a^3\,C+68\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(135\,a^2\,A\,b+30\,A\,b^3+46\,a^2\,b\,C+18\,b^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\left(-15\,a^2\,A\,b+30\,A\,b^3+46\,a^2\,b\,C+18\,b^3\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{22}{15}\,a\,b\,C\,\text{Sin}[c+d\,x]+\frac{1}{5}\,b^2\,C\,\text{Sin}[2\,(c+d\,x)]+a^2\,A\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 643: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,\mathrm{d}x$$

Optimal (type 4, 329 leaves, 11 steps):

$$-\frac{a\,b\,(27\,A-56\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{12\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{b\,\left(8\,b^2\,(3\,A+C)+a^2\,(33\,A+16\,C)\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{12\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a\,\left(15\,A\,b^2+4\,a^2\,(A+2\,C)\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{b^2\,(21\,A-8\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{12\,d}+$$

$$\frac{5\,A\,b\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 582 leaves) :

$$\frac{1}{48\,d}\left(\frac{2\left(12\,a^2\,A\,b+48\,A\,b^3+144\,a^2\,b\,C+16\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(24\,a^3\,A+63\,a\,A\,b^2+48\,a^3\,C+56\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\left(-27\,a\,A\,b^2+56\,a\,b^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2}{3}\,b^2\,C\,\mathrm{Sin}[c+d\,x]+\frac{9}{4}\,a\,A\,b\,\mathrm{Tan}[c+d\,x]+\frac{1}{2}\,a^2\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]\right)}{d}$$

- **Problem 644: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 363 leaves, 11 steps):

$$-\frac{\left(3 b^2 (11 A-16 C)+8 a^2 (2 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{a \left(8 a^2 (2 A+3 C)+b^2 (59 A+96 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{5 b \left(A b^2+4 a^2 (A+2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{8 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(15 A b^2+8 a^2 (2 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]}{24 d}+$$

$$\frac{5 A b (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 d}+\frac{A (a+b \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 616 leaves) :

$$-\frac{1}{96\,d}\,b\left(\frac{2\,(-52\,a\,A\,b-288\,a\,b\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(-104\,a^2\,A+3\,A\,b^2-216\,a^2\,C-48\,b^2\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(16\,a^2\,A+33\,A\,b^2+24\,a^2\,C-48\,b^2\,C\right)\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\mathrm{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{1}{24}\,\mathrm{Sec}[c+d\,x]\,\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]+33\,A\,b^2\,\mathrm{Sin}[c+d\,x]+24\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\frac{13}{12}\,a\,A\,b\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]+$$

$$\left.\frac{1}{3}\,a^2\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 645: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 4, 437 leaves, 12 steps):

$$-\frac{b\left(15\,A\,b^2+4\,a^2\,(71\,A+108\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{192\,a\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{b\left(4\,a^2\,(89\,A+132\,C)+b^2\,(133\,A+384\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{192\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{\left(5\,A\,b^4-120\,a^2\,b^2\,(A+2\,C)-16\,a^4\,(3\,A+4\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{64\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\left(15\,A\,b^2+4\,a^2\,(71\,A+108\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{192\,a\,d}+\frac{\left(5\,A\,b^2+4\,a^2\,(3\,A+4\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\;\text{Tan}[c+d\,x]}{32\,d}+\frac{5\,A\,b\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{24\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{4\,d}$$

Result (type 4, 704 leaves):

$$\frac{1}{768\,a\,d}\left(\frac{2\left(144 a^3 A b+236 a A b^3+192 a^3 b C+768 a b^3 C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{1}{\sqrt{a+b\,\text{Cos}[c+d x]}}\right.$$

$$2\left(288 a^4 A+436 a^2 A b^2-45 A b^4+384 a^4 C+1008 a^2 b^2 C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]-$$

$$\left(2\,\mathrm{i}\left(-284 a^2 A b^2-15 A b^4-432 a^2 b^2 C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d x]}{a+b}}\sqrt{-\frac{b+b\,\text{Cos}[c+d x]}{a-b}}\ \text{Cos}[2(c+d x)]\right.$$

$$\left(2 a(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(2 a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\text{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b\,\text{Cos}[c+d x])+(a+b\,\text{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a(a+b\,\text{Cos}[c+d x])+2(a+b\,\text{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d x]}\left(\frac{1}{96}\text{Sec}[c+d x]^2\left(36 a^2 A\,\text{Sin}[c+d x]+59 A b^2\,\text{Sin}[c+d x]+48 a^2 C\,\text{Sin}[c+d x]\right)+\right.$$

$$\frac{\text{Sec}[c+d x]\left(284 a^2 A b\,\text{Sin}[c+d x]+15 A b^3\,\text{Sin}[c+d x]+432 a^2 b C\,\text{Sin}[c+d x]\right)}{192 a}+$$

$$\left.\frac{17}{24} a A b\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]+\frac{1}{4} a^2 A\,\text{Sec}[c+d x]^3\,\text{Tan}[c+d x]\right)$$

- **Problem 652: Unable to integrate problem.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]}{\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 183 leaves, 8 steps) :

$$\frac{2\,C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{b\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{2\,a\,C\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{b\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 35 leaves):

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

- **Problem 653: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 214 leaves, 9 steps):

$$-\frac{A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{(A+2\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{A\,b\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{a\,d}$$

Result (type 4, 559 leaves):

$$\frac{2\,A\,\mathrm{Cos}[c+d\,x]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\,\mathrm{Sin}[c+d\,x]}{a\,d\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{1}{2\,a\,d\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}\,\mathrm{Cos}[c+d\,x]^2\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left(\frac{8\,a\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\right.$$

$$\frac{6\,A\,b\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\left(2\,i\,A\,b\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\right.$$

$$\left.\left.\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)$$

- **Problem 654: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 278 leaves, 10 steps) :

$$\frac{3 A b \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}-$$

$$\frac{A b \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(3 A b^2+4 a^2(A+2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{3 A b \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{4 a^2 d}+\frac{A \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 a d}$$

Result (type 4, 603 leaves) :

$$\frac{1}{8 a^2 d (2 A+C+C \operatorname{Cos}[2 c+2 d x])} \operatorname{Cos}[c+d x]^2\left(C+A \operatorname{Sec}[c+d x]^2\right)$$

$$\left(\frac{8 a A b \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2\left(8 a^2 A+9 A b^2+16 a^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\right.$$

$$\left(6 i A b^2 \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2(c+d x)]\right.\left(2 a (a-b)\right.$$

$$\operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b\left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\right) \Big/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a(a+b \operatorname{Cos}[c+d x])+2(a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{\operatorname{Cos}[c+d x]^2 \sqrt{a+b \operatorname{Cos}[c+d x]}\left(C+A \operatorname{Sec}[c+d x]^2\right)\left(-\frac{3 A b \operatorname{Tan}[c+d x]}{2 a^2}+\frac{A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{a}\right)}{d (2 A+C+C \operatorname{Cos}[2 c+2 d x])}$$

## Problem 655: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 370 leaves, 11 steps):

$$-\frac{\left(15\,A\,b^2+8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,a^3\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{\left(5\,A\,b^2+8\,a^2\,(2\,A+3\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{24\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{b\,\left(5\,A\,b^2+4\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{8\,a^3\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\left(15\,A\,b^2+8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{24\,a^3\,d}-$$

$$\frac{5\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,a^2\,d}+\frac{A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,a\,d}$$

Result (type 4, 604 leaves):

$$-\frac{1}{96 a^3 d} b \left(\frac{40 a A b \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2 \left(40 a^2 A+45 A b^2+72 a^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\right.$$

$$\left(2 i \left(16 a^2 A+15 A b^2+24 a^2 C\right) \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2 (c+d x)]\right.$$

$$\left(2 a (a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b \left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\Bigg) \Big/$$

$$\left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2} \sqrt{-\frac{a^2-b^2-2 a (a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}}\right.$$

$$\left.\left.\left(2 a^2-b^2-4 a (a+b \operatorname{Cos}[c+d x])+2 (a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{\operatorname{Sec}[c+d x] \left(16 a^2 A \operatorname{Sin}[c+d x]+15 A b^2 \operatorname{Sin}[c+d x]+24 a^2 C \operatorname{Sin}[c+d x]\right)}{24 a^3}-\right.$$

$$\left.\frac{5 A b \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 a^2}+\frac{A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 a}\right)$$

- **Problem 660: Unable to integrate problem.**

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]}{(a+b \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 4, 259 leaves, 9 steps) :

$$-\frac{2\left(A b^2+a^2 C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a\,b\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{2\,C\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{b\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,A\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\left(A b^2+a^2 C\right)\mathrm{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 8, 35 leaves):

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

- **Problem 661: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^2}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 296 leaves, 10 steps):

$$\frac{\left(3 A b^2-a^2(A-2C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a^2\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{A\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{3\,A\,b\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a^2\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{b\left(3 A b^2-a^2(A-2C)\right)\mathrm{Sin}[c+d\,x]}{a^2\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\mathrm{Tan}[c+d\,x]}{a\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 677 leaves):

$$\frac{1}{2 a^2 (a-b) (a+b) d (2 A + C + C \text{Cos}[2 c + 2 d x])} \text{Cos}[c+d x]^2 \left(C + A \text{Sec}[c+d x]^2\right) \left(\frac{2 \left(4 a A b^2 + 4 a^3 C\right) \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}} \text{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \text{Cos}[c+d x]}} + \right.$$

$$\frac{2 \left(-7 a^2 A b + 9 A b^3 + 2 a^2 b C\right) \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}} \text{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \text{Cos}[c+d x]}} -$$

$$\left(2 i \left(-a^2 A b + 3 A b^3 + 2 a^2 b C\right) \sqrt{\frac{b - b \text{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b + b \text{Cos}[c+d x]}{a-b}} \text{Cos}[2 (c+d x)]\right.$$

$$\left(2 a (a-b) \text{EllipticE}\left[i \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \text{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right] + b \left(2 a \text{EllipticF}\left[i \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \text{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right] - b \text{EllipticPi}\left[\frac{a+b}{a}, i \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \text{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \text{Sin}[c+d x]\Bigg) \Bigg/$$

$$\left(a \sqrt{-\frac{1}{a+b}} \sqrt{1 - \text{Cos}[c+d x]^2} \sqrt{-\frac{a^2 - b^2 - 2 a (a + b \text{Cos}[c+d x]) + (a + b \text{Cos}[c+d x])^2}{b^2}}\right.$$

$$\left.\left.\left(2 a^2 - b^2 - 4 a (a + b \text{Cos}[c+d x]) + 2 (a + b \text{Cos}[c+d x])^2\right)\right)\right) +$$

$$\frac{\text{Cos}[c+d x]^2 \sqrt{a+b \text{Cos}[c+d x]} \left(C + A \text{Sec}[c+d x]^2\right) \left(-\frac{4 \left(A b^3 \text{Sin}[c+d x] + a^2 b C \text{Sin}[c+d x]\right)}{a^2 \left(a^2-b^2\right) (a+b \text{Cos}[c+d x])} + \frac{2 A \text{Tan}[c+d x]}{a^2}\right)}{d (2 A + C + C \text{Cos}[2 c + 2 d x])}$$

- **Problem 662: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(A + C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3}{(a + b \text{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 4, 370 leaves, 11 steps):

$$-\frac{b\left(15\,A\,b^2-a^2\,(7\,A-8\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{4\,a^3\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{5\,A\,b\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{4\,a^2\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{\left(15\,A\,b^2+4\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{4\,a^3\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{b^2\left(15\,A\,b^2-a^2\,(7\,A-8\,C)\right)\mathrm{Sin}[c+d\,x]}{4\,a^3\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{5\,A\,b\,\mathrm{Tan}[c+d\,x]}{4\,a^2\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 727 leaves) :

$$-\frac{1}{8\,a^3\,(-a+b)\,(a+b)\,d\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}$$

$$\mathrm{Cos}[c+d\,x]^2\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left(\frac{2\left(4\,a^3\,A\,b-20\,a\,A\,b^3-16\,a^3\,b\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(8\,a^4\,A+29\,a^2\,A\,b^2-45\,A\,b^4+16\,a^4\,C-24\,a^2\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\,\left(7\,a^2\,A\,b^2-15\,A\,b^4-8\,a^2\,b^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\right.\right.$$

$$\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\left(\mathrm{Cos}[c+d\,x]^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left(\frac{4\left(A\,b^4\,\mathrm{Sin}[c+d\,x]+a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])}-\frac{7\,A\,b\,\mathrm{Tan}[c+d\,x]}{2\,a^3}+\right.\right.$$

$$\left.\left.\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{a^2}\right)\right)\Bigg/\left(d\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 667: Unable to integrate problem.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 375 leaves, 10 steps) :

$$\frac{2\left(3Ab^4-a^4C-a^2b^2(7A+3C)\right)\sqrt{a+b\,\text{Cos}[c+dx]}\,\text{EllipticE}\left[\frac{1}{2}(c+dx),\frac{2b}{a+b}\right]}{3a^2b\left(a^2-b^2\right)^2d\sqrt{\frac{a+b\,\text{Cos}[c+dx]}{a+b}}}+\frac{2\left(Ab^2+a^2C\right)\sqrt{\frac{a+b\,\text{Cos}[c+dx]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}(c+dx),\frac{2b}{a+b}\right]}{3ab\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+dx]}}+$$

$$\frac{2A\sqrt{\frac{a+b\,\text{Cos}[c+dx]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}(c+dx),\frac{2b}{a+b}\right]}{a^2d\sqrt{a+b\,\text{Cos}[c+dx]}}+\frac{2\left(Ab^2+a^2C\right)\text{Sin}[c+dx]}{3a\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+dx])^{3/2}}-\frac{2\left(3Ab^4-a^4C-a^2b^2(7A+3C)\right)\text{Sin}[c+dx]}{3a^2\left(a^2-b^2\right)^2d\sqrt{a+b\,\text{Cos}[c+dx]}}$$

Result (type 8, 35 leaves):

$$\int\frac{\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]}{(a+b\,\text{Cos}[c+dx])^{5/2}}\,dx$$

## Problem 668: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^2}{(a+b\,\text{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 4, 416 leaves, 11 steps):

$$\frac{\left(26a^2Ab^2-15Ab^4-a^4(3A-8C)\right)\sqrt{a+b\,\text{Cos}[c+dx]}\,\text{EllipticE}\left[\frac{1}{2}(c+dx),\frac{2b}{a+b}\right]}{3a^3\left(a^2-b^2\right)^2d\sqrt{\frac{a+b\,\text{Cos}[c+dx]}{a+b}}}-$$

$$\frac{\left(5Ab^2-a^2(3A-2C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+dx]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}(c+dx),\frac{2b}{a+b}\right]}{3a^2\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+dx]}}-\frac{5Ab\sqrt{\frac{a+b\,\text{Cos}[c+dx]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}(c+dx),\frac{2b}{a+b}\right]}{a^3d\sqrt{a+b\,\text{Cos}[c+dx]}}-$$

$$\frac{b\left(5Ab^2-a^2(3A-2C)\right)\text{Sin}[c+dx]}{3a^2\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+dx])^{3/2}}-\frac{b\left(26a^2Ab^2-15Ab^4-a^4(3A-8C)\right)\text{Sin}[c+dx]}{3a^3\left(a^2-b^2\right)^2d\sqrt{a+b\,\text{Cos}[c+dx]}}+\frac{A\,\text{Tan}[c+dx]}{ad\,(a+b\,\text{Cos}[c+dx])^{3/2}}$$

Result (type 4, 786 leaves):

$$\frac{1}{6\,a^3\,(-a+b)^2\,(a+b)^2\,d\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])}$$

$$\mathrm{Cos}[c+d\,x]^2\,\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left(\frac{2\left(36\,a^3\,A\,b^2-20\,a\,A\,b^4+12\,a^5\,C+4\,a^3\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(-33\,a^4\,A\,b+86\,a^2\,A\,b^3-45\,A\,b^5+8\,a^4\,b\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\,\left(-3\,a^4\,A\,b+26\,a^2\,A\,b^3-15\,A\,b^5+8\,a^4\,b\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\;\left(2\,a\,(a-b)\right.\right.$$

$$\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\left(\mathrm{Cos}[c+d\,x]^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(C+A\,\mathrm{Sec}[c+d\,x]^2\right)\left(-\frac{4\left(A\,b^3\,\mathrm{Sin}[c+d\,x]+a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^2\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])^2}-\right.\right.$$

$$\left.\left.\frac{8\left(5\,a^2\,A\,b^3\,\mathrm{Sin}[c+d\,x]-3\,A\,b^5\,\mathrm{Sin}[c+d\,x]+2\,a^4\,b\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])}+\frac{2\,A\,\mathrm{Tan}[c+d\,x]}{a^3}\right)\right)\Bigg/\left(d\,(2\,A+C+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 709: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{3/2}\,(a+b\,\mathrm{Cos}[c+d\,x])}\,dx$$

Optimal (type 4, 112 leaves, 6 steps):

$$-\frac{2\,A\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,d}+\frac{2\,C\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]}{b\,d}-\frac{2\,(A\,b^2+a^2\,C)\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]}{a\,b\,(a+b)\,d}+\frac{2\,A\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 242 leaves) :

$$\frac{2\,A\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{1}{2\,a\,d}\left(\frac{6\,A\,b\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]}{a+b}+\frac{(2\,a\,A-2\,a\,C)\left(2\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]-\frac{2\,a\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a+b}\right)}{b}+\right.$$

$$\left(2\,A\,\text{Cos}[2\,(c+d\,x)]\,\left(-2\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],\,-1\right]+2\,a\,(a+b)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],\,-1\right]+\right.\right.$$

$$\left.\left.\left.(2\,a^2-b^2)\,\text{EllipticPi}\left[-\frac{b}{a},\,-\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],\,-1\right]\right)\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,b\,\sqrt{1-\text{Cos}[c+d\,x]^2}\,\left(-1+2\,\text{Cos}[c+d\,x]^2\right)\right)\right)$$

## Problem 727: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 553 leaves, 8 steps) :

$$\frac{1}{24\,a\,b^2\,d}(a-b)\,\sqrt{a+b}\,\left(3\,a^2\,C-8\,b^2\,(3\,A+2\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{24\,b^2\,d}\sqrt{a+b}\,\left(3\,a^2\,C-2\,a\,b\,C-8\,b^2\,(3\,A+2\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{8\,b^3\,d}a\,\sqrt{a+b}\,\left(8\,A\,b^2+(a^2+4\,b^2)\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{\left(3\,a^2\,C-8\,b^2\,(3\,A+2\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1220 leaves) :

$$\frac{1}{48\,b\,d}$$

$$\Bigg(\Bigg(-\Bigg(4\,a\,\left(24\,A\,b^2-a^2\,C+16\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,(48\,a\,A\,b+28\,a\,b\,C)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(24 A b^2-3 a^2 C+16 b^2 C\right)\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a\left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)+\frac{\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{a C \operatorname{Sin}[c+d x]}{12 b}+\frac{1}{6} C \operatorname{Sin}[2(c+d x)]\right)}{d}$$

- **Problem 728: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b \operatorname{Cos}[c+d x]}\left(A+C \operatorname{Cos}[c+d x]^2\right)}{\sqrt{\operatorname{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 455 leaves, 7 steps) :

$$-\frac{1}{4\,b\,d}(a-b)\sqrt{a+b}\;C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b\,d}$$

$$\sqrt{a+b}\;(8\,A\,b+(a+2\,b)\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,b^2\,d}\sqrt{a+b}\;\left(a^2\,C-4\,b^2\,(2\,A+C)\right)\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{a\,C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{C\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1169 leaves):

$$\frac{C\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{2\,d}+\frac{1}{8\,d}$$

$$\left(-\left(4\,a\,(8\,a\,A+3\,a\,C)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a$$

$$(8\,A\,b+4\,b\,C)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$2\,a\,C\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 729: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 439 leaves, 7 steps):

$$\frac{1}{a\,d}(a-b)\sqrt{a+b}\,(2\,A-C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{a\,d}$$
$$\sqrt{a+b}\,(2\,a\,A-2\,A\,b-a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{b\,d}a\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,A\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}-\frac{(2\,A-C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1166 leaves):

$$\frac{2\,A\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{1}{2\,d}\left(-\left(4\,a\,b\,C\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a$$

$$(-2\,a\,A+2\,a\,C)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,(-2\,A\,b+b\,C)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 731: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 345 leaves, 5 steps):

$$-\frac{1}{15\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(2\,A\,b^2-3\,a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{15\,a^2\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,(9\,a\,A+2\,A\,b+15\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1288 leaves):

$$-\frac{1}{15\,a^2\,d}$$

$$\left(-\left(4\, a\, \left(2\, a^2\, A\, b - 2\, A\, b^3\right) \sqrt{\frac{(a+b)\, \mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b)\, \mathrm{Cos}[c+d\,x]\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\, \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\, \mathrm{Csc}[\right.\right.$$

$$\left.c+d\,x]\, \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\, -\frac{2\,a}{-a+b}\right]\, \mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right) \Big/$$

$$\left((a+b)\, \sqrt{\mathrm{Cos}[c+d\,x]}\, \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right) - 4\, a\, \left(9\, a^3\, A - 2\, a\, A\, b^2 + 15\, a^3\, C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\, \mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b)\, \mathrm{Cos}[c+d\,x]\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\, \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\, \mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\, -\frac{2\,a}{-a+b}\right]\, \mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right) \Big/ \left((a+b)\, \sqrt{\mathrm{Cos}[c+d\,x]}\, \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right) -$$

$$\left(\sqrt{\frac{(a+b)\, \mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b)\, \mathrm{Cos}[c+d\,x]\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\, \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\, \mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\, \mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\, -\frac{2\,a}{-a+b}\right]\, \mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right) \Big/ \left(b\, \sqrt{\mathrm{Cos}[c+d\,x]}\, \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right) +$$

$$2\, \left(9\, a^2\, A\, b - 2\, A\, b^3 + 15\, a^2\, b\, C\right) \left(\frac{i\, \mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\, \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\, \mathrm{EllipticE}\left[i\, \mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\, -\frac{2\,a}{-a-b}\right]\, \mathrm{Sec}[c+d\,x]}{b\, \sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\, \mathrm{Sec}[c+d\,x]}\, \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}} +\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]\left(9a^2A\,\text{Sin}[c+d\,x]-2Ab^2\,\text{Sin}[c+d\,x]+15a^2C\,\text{Sin}[c+d\,x]\right)}{15a^2}+\right.$$

$$\frac{2Ab\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{15a}+$$

$$\left.\frac{2}{5}A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 732: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 415 leaves, 6 steps):

$$\frac{1}{105\,a^4\,d}2\,(a-b)\,b\,\sqrt{a+b}\,\left(8\,A\,b^2+a^2\,(19\,A+35\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(6\,a\,A\,b+8\,A\,b^2+5\,a^2\,(5\,A+7\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{7\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}+\frac{2\,A\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{35\,a\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}-\frac{2\,\left(4\,A\,b^2-5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{105\,a^2\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1373 leaves):

$$\frac{1}{105\,a^3\,d}\left(-\left(4\,a\,\left(25\,a^4\,A-17\,a^2\,A\,b^2-8\,A\,b^4+35\,a^4\,C-35\,a^2\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-19\,a^3\,A\,b-8\,a\,A\,b^3-35\,a^3\,b\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-\right.\right.$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-19\,a^2\,A\,b^2-8\,A\,b^4-35\,a^2\,b^2\,C\right)\left(\frac{\mathbb{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \left(\frac{2\,\mathrm{Sec}[c+d\,x]^2\,\left(25\,a^2\,A\,\mathrm{Sin}[c+d\,x]-4\,A\,b^2\,\mathrm{Sin}[c+d\,x]+35\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{105\,a^2}+\right.$$
$$\frac{2\,\mathrm{Sec}[c+d\,x]\,\left(19\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]+8\,A\,b^3\,\mathrm{Sin}[c+d\,x]+35\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)}{105\,a^3}+$$
$$\frac{2\,A\,b\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{35\,a}+$$
$$\left.\frac{2}{7}\,A\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]\right)$$

## Problem 733: Result unnecessarily involves imaginary or complex numbers.

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\ (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 638 leaves, 9 steps):

$$-\frac{1}{64\,b^2\,d}(a-b)\,\sqrt{a+b}\,\left(80\,A\,b^2-3\,a^2\,C+52\,b^2\,C\right)\,\mathrm{Cot}[c+d\,x]$$
$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{64\,b^2\,d}$$
$$\sqrt{a+b}\,\left(3\,a^3\,C-2\,a^2\,b\,C-8\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(20\,A+13\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{64\,b^3\,d}\sqrt{a+b}\,\left(3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\,\mathrm{Cot}[c+d\,x]$$
$$\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{a\,\left(80\,A\,b^2-3\,a^2\,C+52\,b^2\,C\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{64\,b^2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{\left(3\,a^2\,C-4\,b^2\,(4\,A+3\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{32\,b\,d}-$$
$$\frac{a\,C\,\sqrt{\mathrm{Cos}[c+d\,x]}\ (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{8\,b\,d}+\frac{C\,\sqrt{\mathrm{Cos}[c+d\,x]}\ (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1270 leaves) :

$$-\frac{1}{128\,b\,d}\left(\left(-\left(4\,a\,\left(-112\,a\,A\,b^2+a^3\,C-76\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-128\,a^2\,A\,b-64\,A\,b^3-76\,a^2\,b\,C-48\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-80\,a\,A\,b^2+3\,a^3\,C-52\,a\,b^2\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right) +$$

$$\frac{1}{d} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{\left(16 A b^2 + a^2 C + 14 b^2 C\right) \operatorname{Sin}[c+d x]}{32 b} +\right.$$

$$\frac{3}{16}$$
$a$
$C$
$$\operatorname{Sin}[2 (c+d x)] + \frac{1}{16}$$
$b$
$C$
$$\left.\operatorname{Sin}[3 (c+d x)]\right)$$

**Problem 734: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 553 leaves, 8 steps):

$$-\frac{1}{24\,a\,b\,d}(a-b)\,\sqrt{a+b}\,\left(3\,a^2\,C+8\,b^2\,(3\,A+2\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b\,d}\sqrt{a+b}\,\left(48\,a\,A\,b+24\,A\,b^2+3\,a^2\,C+14\,a\,b\,C+16\,b^2\,C\right)$$
$$\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{8\,b^2\,d}a\,\sqrt{a+b}\,\left(24\,A\,b^2-a^2\,C+12\,b^2\,C\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{\left(3\,a^2\,C+8\,b^2\,(3\,A+2\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+$$
$$\frac{a\,C\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d}+\frac{C\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1221 leaves):

$$\frac{1}{48\,d}\left(-\left(4\,a\,\left(48\,a^2\,A+24\,A\,b^2+17\,a^2\,C+16\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,(96\,a\,A\,b+52\,a\,b\,C)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(24\,A\,b^2+3\,a^2\,C+16\,b^2\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{7}{12}\,a\,C\,\text{Sin}[c+d\,x]+\frac{1}{6}\,b\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 735: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 509 leaves, 8 steps) :

$$\frac{1}{4\,d}(a-b)\sqrt{a+b}\,(8\,A-5\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{4\,d}\sqrt{a+b}\,(8\,a\,A-16\,A\,b-5\,a\,C-2\,b\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b\,d}\sqrt{a+b}\,\left(8\,A\,b^2+3\,a^2\,C+4\,b^2\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{a\,(8\,A-5\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\sqrt{\text{Cos}[c+d\,x]}}-\frac{b\,(4\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1209 leaves) :

$$\frac{1}{8 d}\Bigg(\Bigg(4 a (-8 a A b-7 a b C) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg) \Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)+4 a \left(8 a^2 A-8 A b^2-8 a^2 C-4 b^2 C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]$$

$$\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\Bigg)-$$

$$2 (8 a A b-5 a b C)\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right) +$$

$$\left.\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right) + \frac{\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{1}{2} b C \operatorname{Sin}[c+d x] + 2 a A \operatorname{Tan}[c+d x]\right)}{d}$$

- **Problem 736: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b \operatorname{Cos}[c+d x])^{3/2} \left(A+C \operatorname{Cos}[c+d x]^2\right)}{\operatorname{Cos}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 500 leaves, 8 steps) :

$$\frac{1}{3\,a\,d}(a-b)\,b\,\sqrt{a+b}\;(8\,A-3\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{3\,a\,d}\sqrt{a+b}\;\left(6\,A\,b^2+2\,a^2\,(A+3\,C)-a\,(8\,A\,b-3\,b\,C)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$3\,a\,\sqrt{a+b}\;C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{b\,(8\,A-3\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1219 leaves) :

$$\frac{1}{6\,d}\left(-\left(4\,a\,\left(2\,a^2\,A-2\,A\,b^2+6\,a^2\,C+3\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,(-8\,a\,A\,b+12\,a\,b\,C)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-8\,A\,b^2+3\,b^2\,C\right)\,\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{8}{3}\,A\,b\,\text{Tan}[c+d\,x]+\frac{2}{3}\,a\,A\,\text{Sec}[c+d\,x]\ \text{Tan}[c+d\,x]\right)}{d}$$

## Problem 737: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\ \left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 465 leaves, 7 steps):

$$\frac{1}{5\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\ \left(A\,b^2+a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{5\,a\,d}2\,\sqrt{a+b}\ \left(A\,b^2-2\,a\,b\,(2\,A+5\,C)+a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$
$$2\,b\,\sqrt{a+b}\ C\,\text{Cot}[c+d\,x]\ \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}$$

Result (type 4, 1296 leaves):

$$-\frac{1}{5\,a\,d}$$
$$\left(-\left(4\,a\,\left(-a^2\,A\,b+A\,b^3-5\,a^2\,b\,C\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(3 a^3 A+a A b^2+5 a^3 C-5 a b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+$$

$$2\left(3 a^2 A b+A b^3+5 a^2 b C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\text{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right]\text{Sec}[c+d x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\text{Sec}[c+d x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2 a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{2\,\text{Sec}[c+d\,x]\,\left(3\,a^2\,A\,\text{Sin}[c+d\,x]+A\,b^2\,\text{Sin}[c+d\,x]+5\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{5\,a}+\right.$$

$$\frac{4}{5}\,A\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]+\frac{2}{5}\,a\,A$$

$$\left.\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 738: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 418 leaves, 6 steps) :

$$-\frac{1}{105\, a^3\, d}4\, (a-b)\, b\, \sqrt{a+b}\, \left(3\, A\, b^2-a^2\, (41\, A+70\, C)\right)\, \text{Cot}[c+d\, x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\, \text{Cos}[c+d\, x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d\, x]}}\right],-\frac{a+b}{a-b}\right]\, \sqrt{\frac{a\, (1-\text{Sec}[c+d\, x])}{a+b}}\, \sqrt{\frac{a\, (1+\text{Sec}[c+d\, x])}{a-b}}+\frac{1}{105\, a^2\, d}$$

$$2\, (a-b)\, \sqrt{a+b}\, \left(25\, a^2\, A-57\, a\, A\, b-6\, A\, b^2+35\, a^2\, C-105\, a\, b\, C\right)\, \text{Cot}[c+d\, x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\, \text{Cos}[c+d\, x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d\, x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\, (1-\text{Sec}[c+d\, x])}{a+b}}\, \sqrt{\frac{a\, (1+\text{Sec}[c+d\, x])}{a-b}}+\frac{6\, A\, b\, \sqrt{a+b\, \text{Cos}[c+d\, x]}\, \text{Sin}[c+d\, x]}{35\, d\, \text{Cos}[c+d\, x]^{5/2}}+$$

$$\frac{2\, \left(3\, A\, b^2+5\, a^2\, (5\, A+7\, C)\right)\, \sqrt{a+b\, \text{Cos}[c+d\, x]}\, \text{Sin}[c+d\, x]}{105\, a\, d\, \text{Cos}[c+d\, x]^{3/2}}+\frac{2\, A\, (a+b\, \text{Cos}[c+d\, x])^{3/2}\, \text{Sin}[c+d\, x]}{7\, d\, \text{Cos}[c+d\, x]^{7/2}}$$

Result (type 4, 1371 leaves) :

$$\frac{1}{105\, a^2\, d}\Bigg(-\Bigg(\Bigg(4\, a\, \left(25\, a^4\, A-31\, a^2\, A\, b^2+6\, A\, b^4+35\, a^4\, C-35\, a^2\, b^2\, C\right)\, \sqrt{\frac{(a+b)\, \text{Cot}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b)\, \text{Cos}[c+d\, x]\, \text{Csc}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\, \text{Cos}[c+d\, x])\, \text{Csc}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a}}\, \text{Csc}[c+d\, x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\, \text{Cos}[c+d\, x])\, \text{Csc}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\, a}{-a+b}\right]\, \text{Sin}\left[\frac{1}{2}\, (c+d\, x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\, \sqrt{\text{Cos}[c+d\, x]}\, \sqrt{a+b\, \text{Cos}[c+d\, x]}\right)\Bigg)-4\, a\, \left(-82\, a^3\, A\, b+6\, a\, A\, b^3-140\, a^3\, b\, C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\, \text{Cot}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b)\, \text{Cos}[c+d\, x]\, \text{Csc}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a}}\, \sqrt{\frac{(a+b\, \text{Cos}[c+d\, x])\, \text{Csc}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a}}\, \text{Csc}[c+d\, x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\, \text{Cos}[c+d\, x])\, \text{Csc}\left[\frac{1}{2}\, (c+d\, x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\, a}{-a+b}\right]\, \text{Sin}\left[\frac{1}{2}\, (c+d\, x)\right]^4\Bigg)\Bigg/\left((a+b)\, \sqrt{\text{Cos}[c+d\, x]}\, \sqrt{a+b\, \text{Cos}[c+d\, x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-82\,a^2\,A\,b^2+6\,A\,b^4-140\,a^2\,b^2\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]^2\,\left(25\,a^2\,A\,\text{Sin}[c+d\,x]+3\,A\,b^2\,\text{Sin}[c+d\,x]+35\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{105\,a}+\right.$$

$$\frac{4\,\text{Sec}[c+d\,x]\,\left(41\,a^2\,A\,b\,\text{Sin}[c+d\,x]-3\,A\,b^3\,\text{Sin}[c+d\,x]+70\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^2}+$$

$$\frac{16}{35}\,A\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\left.\frac{2}{7}\,a\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 739: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 502 leaves, 7 steps) :

$$\frac{1}{315\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^4+21\,a^4\,(7\,A+9\,C)+3\,a^2\,b^2\,(11\,A+21\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{315\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(6\,a\,A\,b^2+8\,A\,b^3-21\,a^3\,(7\,A+9\,C)+a^2\,(39\,A\,b+63\,b\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{21\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,\left(3\,A\,b^2+7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}-$$

$$\frac{4\,b\,\left(2\,A\,b^2-a^2\,(44\,A+63\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{9\,d\,\text{Cos}[c+d\,x]^{9/2}}$$

Result (type 4, 1485 leaves) :

$$-\frac{1}{315 a^3 d}\left(-\left(4 a \left(-39 a^4 A b+31 a^2 A b^3+8 A b^5-63 a^4 b C+63 a^2 b^3 C\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(147 a^5 A+33 a^3 A b^2+8 a A b^4+189 a^5 C+63 a^3 b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+2 \left(147 a^4 A b+33 a^2 A b^3+8 A b^5+189 a^4 b C+63 a^2 b^3 C\right)$$

$$\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a\left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)+$$

$$\frac{1}{d} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{2 \operatorname{Sec}[c+d x]^3\left(49 a^2 A \operatorname{Sin}[c+d x]+3 A b^2 \operatorname{Sin}[c+d x]+63 a^2 C \operatorname{Sin}[c+d x]\right)}{315 a}+\right.$$

$$\frac{4 \operatorname{Sec}[c+d x]^2\left(44 a^2 A b \operatorname{Sin}[c+d x]-2 A b^3 \operatorname{Sin}[c+d x]+63 a^2 b C \operatorname{Sin}[c+d x]\right)}{315 a^2}+$$

$$\frac{1}{315 a^3}$$

$$2\,\mathrm{Sec}[c+d\,x]\,\left(147\,a^4\,A\,\mathrm{Sin}[c+d\,x]+33\,a^2\,A\,b^2\,\mathrm{Sin}[c+d\,x]+8\,A\,b^4\,\mathrm{Sin}[c+d\,x]+189\,a^4\,C\,\mathrm{Sin}[c+d\,x]+63\,a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{20}{63}\,A\,b\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]+\frac{2}{9}\,a\,A\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]\Bigg)$$

- **Problem 740: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 746 leaves, 10 steps):

$$\frac{1}{1920\,a\,b^2\,d}(a-b)\,\sqrt{a+b}\,\left(45\,a^4\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{1920\,b^2\,d}\sqrt{a+b}\,\left(45\,a^4\,C-30\,a^3\,b\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)-8\,a\,b^3\,(260\,A+193\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{128\,b^3\,d}a\,\sqrt{a+b}\,\left(3\,a^4\,C+40\,a^2\,b^2\,(2\,A+C)+80\,b^4\,(4\,A+3\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{\left(45\,a^4\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{1920\,b^2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{a\,\left(240\,A\,b^2-15\,a^2\,C+172\,b^2\,C\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{320\,b\,d}-\frac{\left(15\,a^2\,C-16\,b^2\,(5\,A+4\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{240\,b\,d}-\frac{3\,a\,C\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{40\,b\,d}+\frac{C\,\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{7/2}\,\mathrm{Sin}[c+d\,x]}{5\,b\,d}$$

Result (type 4, 1341 leaves):

$$-\frac{1}{3840\,b\,d}\Bigg(-\Bigg(4\,a\,\left(-4720\,a^2\,A\,b^2-1280\,A\,b^4+15\,a^4\,C-3236\,a^2\,b^2\,C-1024\,b^4\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-3840\,a^3\,A\,b-6080\,a\,A\,b^3-2292\,a^3\,b\,C-4624\,a\,b^3\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+2\,\left(-2640\,a^2\,A\,b^2-1280\,A\,b^4+45\,a^4\,C-1692\,a^2\,b^2\,C-1024\,b^4\,C\right)$$

$$\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a\left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)+$$

$$\frac{1}{d} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{a\left(1040 A b^2+15 a^2 C+898 b^2 C\right) \operatorname{Sin}[c+d x]}{960 b}+\right.$$

$$\frac{1}{480}\left(80 A b^2+93 a^2 C+88 b^2 C\right)$$

$$\operatorname{Sin}[2(c+d x)]+\frac{21}{160}$$

a
b
C
$\text{Sin}[3\,(c+d\,x)] + \frac{1}{40}$
$b^2$
C
$\text{Sin}[4\,(c+d\,x)]\Big)$

## Problem 741: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 635 leaves, 9 steps):

$$-\frac{1}{192\,b\,d}(a-b)\,\sqrt{a+b}\,\left(432\,A\,b^2+15\,a^2\,C+284\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{192\,b\,d}\sqrt{a+b}\,\left(15\,a^3\,C+24\,b^3\,(4\,A+3\,C)+2\,a^2\,b\,(192\,A+59\,C)+4\,a\,b^2\,(108\,A+71\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{64\,b^2\,d}\sqrt{a+b}\,\left(5\,a^4\,C-120\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{a\,\left(432\,A\,b^2+15\,a^2\,C+284\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{\left(5\,a^2\,C+4\,b^2\,(4\,A+3\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,d}+\frac{5\,a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 4, 1275 leaves):

$$\frac{1}{384\,d}\left(-\left(4\,a\,\left(384\,a^3\,A+528\,a\,A\,b^2+133\,a^3\,C+356\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(1152\,a^2\,A\,b+192\,A\,b^3+644\,a^2\,b\,C+144\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(432\,a\,A\,b^2+15\,a^3\,C+284\,a\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\left(\frac{1}{96}\left(48\,A\,b^2+59\,a^2\,C+42\,b^2\,C\right)\text{Sin}[c+d x]+\frac{17}{48}\,a\,b\,C\,\text{Sin}[2\,(c+d x)]+\right.$$

$$\left.\frac{1}{16}\,b^2\,C\,\text{Sin}[3\,(c+d x)]\right)$$

- **Problem 742: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d x])^{5/2}\left(A+C\,\text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{3/2}}\,dx$$

Optimal (type 4, 609 leaves, 9 steps):

$$\frac{1}{24\,a\,d}(a-b)\sqrt{a+b}\left(a^2(48A-33C)-8b^2(3A+2C)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{24\,d}$$

$$\sqrt{a+b}\left(a^2(48A-33C)-8b^2(3A+2C)-2ab(72A+13C)\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d}5a\sqrt{a+b}\left(8Ab^2+\left(a^2+4b^2\right)C\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{\left(a^2(48A-33C)-8b^2(3A+2C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\sqrt{\text{Cos}[c+d\,x]}}-\frac{a\,b\,(8A-3C)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}-$$

$$\frac{b\,(6A-C)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1262 leaves) :

$$\frac{1}{48\,d}\left(\left(4a\left(-96a^2Ab-24Ab^3-59a^2bC-16b^3C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4a\left(48a^3A-144aAb^2-48a^3C-76ab^2C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\,\left(48\,a^2\,A\,b-24\,A\,b^3-33\,a^2\,b\,C-16\,b^3\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/$$

$$\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{13}{12}\,a\,b\,C\,\mathrm{Sin}[c+d\,x]+\frac{1}{6}\,b^2\,C\,\mathrm{Sin}[2\,(c+d\,x)]+2\,a^2\,A\,\mathrm{Tan}[c+d\,x]\right)}{d}$$

- **Problem 743: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 567 leaves, 9 steps) :

$$\frac{1}{12\,d}(a-b)\,b\,\sqrt{a+b}\,(56\,A-27\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{12\,d}\sqrt{a+b}\,\left(6\,b^2\,(12\,A+C)+8\,a^2\,(A+3\,C)-a\,(56\,A\,b-27\,b\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d}\sqrt{a+b}\,\left(8\,A\,b^2+15\,a^2\,C+4\,b^2\,C\right)\,\mathrm{Cot}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{a\,b\,(56\,A-27\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{b^2\,(8\,A-C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d}+$$

$$\frac{10\,A\,b\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1256 leaves) :

$$\frac{1}{24\,d}\left(-\left(4\,a\,\left(8\,a^3\,A+16\,a\,A\,b^2+24\,a^3\,C+33\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-56\,a^2\,A\,b+24\,A\,b^3+72\,a^2\,b\,C+12\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-56\,a\,A\,b^2+27\,a\,b^2\,C\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{2}b^2\,C\,\mathrm{Sin}[c+d\,x]+\frac{14}{3}a\,A\,b\,\mathrm{Tan}[c+d\,x]+\frac{2}{3}a^2\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 744: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 606 leaves, 9 steps):

$$\frac{1}{15\,a\,d}(a-b)\sqrt{a+b}\left(b^2(46A-15C)+6a^2(3A+5C)\right)\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{15\,a\,d}\sqrt{a+b}\left(30\,A\,b^3-a\,b^2(46A-15C)-6a^3(3A+5C)+a^2(34\,A\,b+90\,b\,C)\right)$$

$$\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$5\,a\,b\sqrt{a+b}\,C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\left(5\,A\,b^2+a^2(3A+5C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{\left(b^2(46A-15C)+6a^2(3A+5C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d\sqrt{\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,A\,b\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}$$

Result (type 4, 1309 leaves) :

$$\frac{1}{30\,d}\left(\left(4\,a\left(-16\,a^2\,A\,b+16\,A\,b^3-60\,a^2\,b\,C-15\,b^3\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+4\,a\left(18\,a^3\,A+46\,a\,A\,b^2+30\,a^3\,C-90\,a\,b^2\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\,\left(18\,a^2\,A\,b+46\,A\,b^3+30\,a^2\,b\,C-15\,b^3\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\mathrm{Csc}[c+d\,x]\ \mathrm{EllipticPi}\left[-\frac{a}{b},\ \mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/$$

$$\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg) + \frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{1}{d}$$

$$\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \Bigg(\frac{2}{15}\mathrm{Sec}[c+d\,x]\left(9\,a^2\,A\,\mathrm{Sin}[c+d\,x]+23\,A\,b^2\,\mathrm{Sin}[c+d\,x]+15\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+$$
$$\frac{22}{15}\,a\,A\,b\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]+$$
$$\frac{2}{5}\,a^2\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\Bigg)$$

- **Problem 745: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 540 leaves, 8 steps):

$$\frac{1}{21\,a^2\,d}2\,(a-b)\,b\,\sqrt{a+b}\,\left(3\,A\,b^2+a^2\,(29\,A+49\,C)\right)\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\ -\frac{1}{21\,a\,d}2\,\sqrt{a+b}\,\left(3\,A\,b^3-9\,a\,b^2\,(3\,A+7\,C)-a^3\,(5\,A+7\,C)+a^2\,b\,(29\,A+49\,C)\right)$$
$$\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\ -\frac{1}{d}$$
$$2\,b^2\,\sqrt{a+b}\,C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\ \mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\ +$$
$$\frac{2\left(3\,A\,b^2+a^2\,(5\,A+7\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{21\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,b\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{7\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{7\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}$$

Result (type 4, 1378 leaves):

$$\frac{1}{21\,a\,d}\Bigg(-\Bigg(4\,a\,\left(5\,a^4\,A-2\,a^2\,A\,b^2-3\,A\,b^4+7\,a^4\,C+14\,a^2\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-29\,a^3\,A\,b-3\,a\,A\,b^3-49\,a^3\,b\,C+21\,a\,b^3\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(-29\,a^2\,A\,b^2-3\,A\,b^4-49\,a^2\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{21}\text{Sec}[c+d\,x]^2\left(5\,a^2\,A\,\text{Sin}[c+d\,x]+9\,A\,b^2\,\text{Sin}[c+d\,x]+7\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]\left(29\,a^2\,A\,b\,\text{Sin}[c+d\,x]+3\,A\,b^3\,\text{Sin}[c+d\,x]+49\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{21\,a}+$$

$$\frac{6}{7}a\,A\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+$$

$$\left.\frac{2}{7}a^2\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 746: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 504 leaves, 7 steps) :

$$-\frac{1}{315\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^4-21\,a^4\,(7\,A+9\,C)-3\,a^2\,b^2\,(93\,A+161\,C)\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$
$$\frac{1}{315\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^3+21\,a^3\,(7\,A+9\,C)+15\,a\,b^2\,(11\,A+21\,C)-6\,a^2\,b\,(19\,A+28\,C)\right)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$
$$\frac{2\,\left(15\,A\,b^2+7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,b\,\left(5\,A\,b^2+a^2\,(163\,A+231\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}+$$
$$\frac{10\,A\,b\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{63\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{9\,d\,\text{Cos}[c+d\,x]^{9/2}}$$

Result (type 4, 1485 leaves) :

$$-\frac{1}{315\,a^2\,d}\left(\left(-\left(4\,a\,\left(-114\,a^4\,A\,b+124\,a^2\,A\,b^3-10\,A\,b^5-168\,a^4\,b\,C+168\,a^2\,b^3\,C\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(147\,a^5\,A+279\,a^3\,A\,b^2-10\,a\,A\,b^4+189\,a^5\,C+483\,a^3\,b^2\,C\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+2\left(147\,a^4\,A\,b+279\,a^2\,A\,b^3-10\,A\,b^5+189\,a^4\,b\,C+483\,a^2\,b^3\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{315}\,\text{Sec}[c+d\,x]^3\,\left(49\,a^2\,A\,\text{Sin}[c+d\,x]+75\,A\,b^2\,\text{Sin}[c+d\,x]+63\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]^2\,\left(163\,a^2\,A\,b\,\text{Sin}[c+d\,x]+5\,A\,b^3\,\text{Sin}[c+d\,x]+231\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{315\,a}+$$

$$\frac{1}{315\,a^2}$$

$$2\,\text{Sec}[c+d\,x]\,\left(147\,a^4\,A\,\text{Sin}[c+d\,x]+279\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]-10\,A\,b^4\,\text{Sin}[c+d\,x]+189\,a^4\,C\,\text{Sin}[c+d\,x]+483\,a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\frac{38}{63}\,a\,A\,b\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]+$$

$$\left.\frac{2}{9}\,a^2\,A\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 747: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 4, 587 leaves, 8 steps) :

$$\frac{1}{693 a^4 d} 2 (a-b) b \sqrt{a+b} \left(8 A b^4 + 3 a^2 b^2 (17 A + 33 C) + a^4 (741 A + 957 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{693 a^3 d}$$

$$2 (a-b) \sqrt{a+b} \left(6 a A b^3 + 8 A b^4 + 15 a^4 (9 A + 11 C) + 3 a^2 b^2 (19 A + 33 C) - 6 a^3 b (101 A + 132 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 \left(5 A b^2 + 3 a^2 (9 A + 11 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{231 d \text{Cos}[c+d x]^{7/2}} + \frac{2 b \left(3 A b^2 + a^2 (229 A + 297 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{693 a d \text{Cos}[c+d x]^{5/2}} -$$

$$\frac{2 \left(4 A b^4 - 15 a^4 (9 A + 11 C) - a^2 b^2 (205 A + 297 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{693 a^2 d \text{Cos}[c+d x]^{3/2}} +$$

$$\frac{10 A b (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{99 d \text{Cos}[c+d x]^{9/2}} + \frac{2 A (a+b \text{Cos}[c+d x])^{5/2} \text{Sin}[c+d x]}{11 d \text{Cos}[c+d x]^{11/2}}$$

Result (type 4, 1591 leaves):

$$\frac{1}{693 a^3 d} \left(-\left(4 a \left(135 a^6 A - 78 a^4 A b^2 - 49 a^2 A b^4 - 8 A b^6 + 165 a^6 C - 66 a^4 b^2 C - 99 a^2 b^4 C\right)\right.\right.$$

$$\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}$$

$$\left.\text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) - 4 a \left(-741 a^5 A b - 51 a^3 A b^3 - 8 a A b^5 - 957 a^5 b C - 99 a^3 b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+2\,\left(-741\,a^4\,A\,b^2-51\,a^2\,A\,b^4-8\,A\,b^6-957\,a^4\,b^2\,C-99\,a^2\,b^4\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2}{693}\mathrm{Sec}[c+d\,x]^4\left(81\,a^2\,A\,\mathrm{Sin}[c+d\,x]+113\,A\,b^2\,\mathrm{Sin}[c+d\,x]+99\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\frac{2\,\mathrm{Sec}[c+d\,x]^3\left(229\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]+3\,A\,b^3\,\mathrm{Sin}[c+d\,x]+297\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)}{693\,a}+\frac{1}{693\,a^2}$$

$$2\,\mathrm{Sec}[c+d\,x]^2\left(135\,a^4\,A\,\mathrm{Sin}[c+d\,x]+205\,a^2\,A\,b^2\,\mathrm{Sin}[c+d\,x]-4\,A\,b^4\,\mathrm{Sin}[c+d\,x]+165\,a^4\,C\,\mathrm{Sin}[c+d\,x]+297\,a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\frac{1}{693\,a^3}2\,\mathrm{Sec}[c+d\,x]\left(741\,a^4\,A\,b\,\mathrm{Sin}[c+d\,x]+51\,a^2\,A\,b^3\,\mathrm{Sin}[c+d\,x]+8\,A\,b^5\,\mathrm{Sin}[c+d\,x]+957\,a^4\,b\,C\,\mathrm{Sin}[c+d\,x]+99\,a^2\,b^3\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\left.\frac{46}{99}\,a\,A\,b\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]+\frac{2}{11}\,a^2\,A\,\mathrm{Sec}[c+d\,x]^5\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 748: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{3/2}\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 554 leaves, 8 steps):

$$-\frac{1}{24\,a\,b^3\,d}(a-b)\sqrt{a+b}\,\left(15\,a^2\,C+8\,b^2\,(3\,A+2\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b^3\,d}\sqrt{a+b}\,\left(15\,a^2\,C-10\,a\,b\,C+8\,b^2\,(3\,A+2\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{8\,b^4\,d}$$

$$a\,\sqrt{a+b}\,\left(8\,A\,b^2+5\,a^2\,C+4\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(15\,a^2\,C+8\,b^2\,(3\,A+2\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{5\,a\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,b^2\,d}+\frac{C\,\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1216 leaves) :

$$\frac{1}{48\,b^2\,d}$$

$$\left(-\left(4\,a\,\left(24\,A\,b^2+5\,a^2\,C+16\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]$$

$$\left.\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$16\,a^2\,b\,C\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(24\,A\,b^2+15\,a^2\,C+16\,b^2\,C\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(-\frac{5\,a\,C\,\text{Sin}[c+d\,x]}{12\,b^2}+\frac{C\,\text{Sin}[2\,(c+d\,x)]}{6\,b}\right)}{d}$$

- **Problem 749: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 455 leaves, 7 steps):

$$\frac{1}{4\,b^2\,d}3\,(a-b)\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^2\,d}$$

$$(3\,a-2\,b)\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{4\,b^3\,d}\sqrt{a+b}\,\left(3\,a^2\,C+4\,b^2\,(2\,A+C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{3\,a\,C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d}$$

Result (type 4, 1169 leaves):

$$\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d}-$$

$$\frac{1}{8\,b\,d}\left(-\left(4\,a^2\,C\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a$$

$$(-8\,A\,b-4\,b\,C)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$6\,a\,C\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)$$

- **Problem 750: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d x]^2}{\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 393 leaves, 6 steps) :

$$-\frac{1}{a\,b\,d}(a-b)\sqrt{a+b}\;C\,\mathrm{Cot}[c+d\,x]\;\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{a\,b\,d}$$

$$\sqrt{a+b}\;(2\,A\,b+a\,C)\;\mathrm{Cot}[c+d\,x]\;\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{b^2\,d}a\sqrt{a+b}\;C\,\mathrm{Cot}[c+d\,x]\;\mathrm{EllipticPi}\Big[\frac{a+b}{b},\mathrm{ArcSin}\Big[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{C\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\,d\sqrt{\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 741 leaves) :

$$\frac{1}{2\,d}\Bigg(-\Bigg(4\,a\,(2\,A+C)\sqrt{\frac{(a+b)\,\mathrm{Cot}\big[\frac{1}{2}(c+d\,x)\big]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\Bigg[\mathrm{ArcSin}\Bigg[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[\frac{1}{2}(c+d\,x)]^2}{a}}}{\sqrt{2}}\Bigg],-\frac{2\,a}{-a+b}\Bigg]\,\mathrm{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Bigg/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$2\,C\left(\frac{i\,\mathrm{Cos}\big[\frac{1}{2}(c+d\,x)\big]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\Big[i\,\mathrm{ArcSinh}\Big[\frac{\mathrm{Sin}[\frac{1}{2}(c+d\,x)]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\Big],-\frac{2\,a}{-a-b}\Big]\,\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\big[\frac{1}{2}(c+d\,x)\big]^2\,\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\big[\frac{1}{2}(c+d\,x)\big]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 751: Result more than twice size of optimal antiderivative.

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 343 leaves, 6 steps) :

$$\frac{1}{a^2\,d}2\,A\,(a-b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{2\,A\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a\,d}-\frac{1}{b\,d}$$

$$2\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 2642 leaves) :

$$\frac{2 A \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{a d \sqrt{\operatorname{Cos}[c+d x]}}-\left((1+\operatorname{Cos}[c+d x])^{3/2}\left(-\frac{A \sqrt{\operatorname{Cos}[c+d x]}}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{C \sqrt{\operatorname{Cos}[c+d x]}}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{2 A b \operatorname{Cos}[c+d x]^{3/2}}{a \sqrt{a+b \operatorname{Cos}[c+d x]}}\right)\right.$$

$$\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2\left(2 A (a+b) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}} \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-\right.$$

$$2 a (A-C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}} \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+$$

$$4 a C \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}} \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+A b \sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}}$$

$$\left.\left.\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right] \operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]+2 a A \sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}} \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-A b \sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}} \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)\right) \Big/$$

$$\left(2 a d \sqrt{a+b \operatorname{Cos}[c+d x]}\left(-\frac{1}{4 a (a+b \operatorname{Cos}[c+d x])^{3/2}} b (1+\operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sin}[c+d x]\right.\right.$$

$$\left(2 A (a+b) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}} \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-\right.$$

$$2 a (A-C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}} \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+4 a C \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}}$$

$$\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+A b \sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}} \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right] \operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]+$$

$$\left.2 a A \sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}} \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-A b \sqrt{\frac{\operatorname{Cos}[c+d x]}{1+\operatorname{Cos}[c+d x]}} \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right)+\frac{1}{4 a \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

$$3 \sqrt{1+\operatorname{Cos}[c+d x]} \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sin}[c+d x]\left(2 A (a+b) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{(a+b)(1+\operatorname{Cos}[c+d x])}} \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-\right.$$

$$2\,a\,(A-C)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]+$$

$$4\,a\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]+A\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\text{Sin}\Big[\frac{3}{2}\,(c+d\,x)\Big]+2\,a\,A\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-A\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg)-$$

$$\frac{1}{2\,a\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg(2\,A\,(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\Big[$$

$$\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]-2\,a\,(A-C)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]+$$

$$4\,a\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]+A\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\text{Sin}\Big[\frac{3}{2}\,(c+d\,x)\Big]+2\,a\,A\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-A\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg)-$$

$$\frac{1}{2\,a\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Bigg(\frac{3}{2}\,A\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Cos}\Big[\frac{3}{2}\,(c+d\,x)\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$a\,A\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2-\frac{1}{2}\,A\,b\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}A\,(a+b)\,\text{EllipticE}\Big[$$

$$\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\;\frac{-a+b}{a+b}\Big]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}a\,(A-C)$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}+\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])^2}\right)+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}}$$

$$2 a C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(-\frac{b\,\text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}+\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])^2}\right)+$$

$$\frac{A b\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]\left(\frac{\text{Cos}[c+d x]\,\text{Sin}[c+d x]}{(1+\text{Cos}[c+d x])^2}-\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right)\text{Sin}\left[\frac{3}{2}(c+d x)\right]}{2\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}}+\frac{a A\left(\frac{\text{Cos}[c+d x]\,\text{Sin}[c+d x]}{(1+\text{Cos}[c+d x])^2}-\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}}-$$

$$\frac{A b\left(\frac{\text{Cos}[c+d x]\,\text{Sin}[c+d x]}{(1+\text{Cos}[c+d x])^2}-\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right)\text{Tan}\left[\frac{1}{2}(c+d x)\right]}{2\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}}+\frac{1}{2}A b\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]\text{Sin}\left[\frac{3}{2}(c+d x)\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]-$$

$$\frac{a(A-C)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{1-\frac{(-a+b)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}-\frac{2 a C\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{1-\frac{(-a+b)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}+$$

$$\left.\left.\left.\frac{A(a+b)\sqrt{\frac{a+b\,\text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\frac{(-a+b)\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)\right)\right)$$

- **Problem 752: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{5/2}\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 283 leaves, 4 steps) :

$$-\frac{1}{3 a^3 d}4 A (a-b) b \sqrt{a+b} \,\text{Cot}[c+d x] \,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{3 a^2 d}$$

$$2 \sqrt{a+b} (2 A b + a (A+3 C)) \,\text{Cot}[c+d x] \,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 A \sqrt{a+b \,\text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{3 a d \,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1204 leaves) :

$$\frac{1}{3 a^2 d}$$

$$\left(-\left(4 a \left(a^2 A + 2 A b^2 + 3 a^2 C\right) \sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[\right.\right.$$

$$\left.c+d x] \,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \,\text{Cos}[c+d x]}\right) -$$

$$8 a^2 A b \left(\left(\sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \,\text{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$4\,A\,b^2\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(-\frac{4\,A\,b\,\text{Tan}[c+d\,x]}{3\,a^2}+\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a}\right)}{d}$$

- **Problem 753: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 354 leaves, 5 steps):

$$\frac{1}{15\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2+3\,a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{15\,a^3\,d}2\,\sqrt{a+b}\,\left(2\,a\,A\,b-8\,A\,b^2-3\,a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}-\frac{8\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1298 leaves):

$$-\frac{1}{15\,a^3\,d}\left(-\left(\left(4\,a\,\left(7\,a^2\,A\,b+8\,A\,b^3+15\,a^2\,b\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-4\,a\,\left(9\,a^3\,A+8\,a\,A\,b^2+15\,a^3\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-\right.$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(9\,a^2\,A\,b+8\,A\,b^3+15\,a^2\,b\,C\right)\,\left(\frac{\mathrm{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) + \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\text{Sec}[c+d\,x]\,\left(9\,a^2\,A\,\text{Sin}[c+d\,x]+8\,A\,b^2\,\text{Sin}[c+d\,x]+15\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{15\,a^3} - \frac{8\,A\,b\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{15\,a^2} + \frac{2\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\,a}\right)$$

- **Problem 754: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{9/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 429 leaves, 6 steps):

$$-\frac{1}{105\,a^5\,d}4\,(a-b)\,b\,\sqrt{a+b}\,\left(24\,A\,b^2+a^2\,(22\,A+35\,C)\right)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{105\,a^4\,d}$$
$$2\,\sqrt{a+b}\,\left(12\,a\,A\,b^2-48\,A\,b^3-5\,a^3\,(5\,A+7\,C)-a^2\,(44\,A\,b+70\,b\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} + \frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{7\,a\,d\,\text{Cos}[c+d\,x]^{7/2}} -$$
$$\frac{12\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{35\,a^2\,d\,\text{Cos}[c+d\,x]^{5/2}} + \frac{2\,\left(24\,A\,b^2+5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{105\,a^3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1376 leaves):

$$\frac{1}{105\,a^4\,d}\left(-\left(4\,a\,\left(25\,a^4\,A+32\,a^2\,A\,b^2+48\,A\,b^4+35\,a^4\,C+70\,a^2\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(44\,a^3\,A\,b+48\,a\,A\,b^3+70\,a^3\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(44\,a^2\,A\,b^2+48\,A\,b^4+70\,a^2\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]^2\left(25\,a^2\,A\,\text{Sin}[c+d\,x]+24\,A\,b^2\,\text{Sin}[c+d\,x]+35\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^3}-\right.$$

$$\frac{4\,\text{Sec}[c+d\,x]\left(22\,a^2\,A\,b\,\text{Sin}[c+d\,x]+24\,A\,b^3\,\text{Sin}[c+d\,x]+35\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^4}-$$

$$\frac{12\,A\,b\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{35\,a^2}+$$

$$\left.\frac{2\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{7\,a}\right)$$

- **Problem 755: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 604 leaves, 8 steps) :

$$\frac{1}{4 b^3 \sqrt{a+b}\, d}\left(8 A b^2+15 a^2 C-7 b^2 C\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{4 b^3 \sqrt{a+b}\, d}$$

$$\left(8 A b^2+\left(15 a^2+5 a b-2 b^2\right) C\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{1}{4 b^4 d}\sqrt{a+b}\, \left(8 A b^2+15 a^2 C+4 b^2 C\right) \text{Cot}[c+d x] \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{2 \left(A b^2+a^2 C\right) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{b \left(a^2-b^2\right) d \sqrt{a+b \text{Cos}[c+d x]}}-$$

$$\frac{a \left(8 A b^2+15 a^2 C-7 b^2 C\right) \sqrt{a+b \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{4 b^3 \left(a^2-b^2\right) d \sqrt{\text{Cos}[c+d x]}}+\frac{\left(4 A b^2+5 a^2 C-b^2 C\right) \sqrt{\text{Cos}[c+d x]}\, \sqrt{a+b \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{2 b^2 \left(a^2-b^2\right) d}$$

Result (type 4, 1276 leaves) :

$$\frac{\sqrt{\text{Cos}[c+d x]}\, \sqrt{a+b \text{Cos}[c+d x]} \left(\frac{C \text{Sin}[c+d x]}{2 b^2}-\frac{2 \left(a A b^2 \text{Sin}[c+d x]+a^3 C \text{Sin}[c+d x]\right)}{b^2 \left(-a^2+b^2\right) (a+b \text{Cos}[c+d x])}\right)}{d}-$$

$$\frac{1}{8 (a-b) b^2 (a+b) d}\left(-\left(\left(4 a \left(5 a^3 C-5 a b^2 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/$$

$$\left.\left((a+b) \sqrt{\text{Cos}[c+d x]}\, \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(8 A b^3+4 a^2 b C+4 b^3 C\right)\right.$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(8\,a\,A\,b^2+15\,a^3\,C-7\,a\,b^2\,C\right)\,\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\operatorname{Csc}[c+d x]\, \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg) \Big/$$

$$\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\Bigg) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\Bigg)\Bigg)$$

■ **Problem 756: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]}\left(A+C \operatorname{Cos}[c+d x]^2\right)}{(a+b \operatorname{Cos}[c+d x])^{3/2}}\, dx$$

Optimal (type 4, 503 leaves, 7 steps):

$$-\frac{1}{a b^2 \sqrt{a+b}\, d}\left(2 A b^2+3 a^2 C-b^2 C\right) \operatorname{Cot}[c+d x]$$

$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{1}{a b^2 \sqrt{a+b}\, d}$$

$$\left(2 A b^2+a(3 a+b) C\right) \operatorname{Cot}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}+$$

$$\frac{1}{b^3 d} 3 a \sqrt{a+b}\, C \operatorname{Cot}[c+d x] \operatorname{EllipticPi}\left[\frac{a+b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}-$$

$$\frac{2\left(A b^2+a^2 C\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b\left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(2 A b^2+3 a^2 C-b^2 C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b^2\left(a^2-b^2\right) d \sqrt{\operatorname{Cos}[c+d x]}}$$

Result (type 4, 1234 leaves):

$$\frac{2 \sqrt{\operatorname{Cos}[c+d x]}\left(A b^2 \operatorname{Sin}[c+d x]+a^2 C \operatorname{Sin}[c+d x]\right)}{b\left(-a^2+b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{2(a-b) b(a+b) d}$$

$$\Bigg(-\Bigg(4\,a\,\left(a^2\,C-b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\,(2\,a\,A\,b+2\,a\,b\,C)\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+$$

$$d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(2\,A\,b^2+3\,a^2\,C-b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+dx]\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\operatorname{Cos}[c+dx]}\operatorname{Sin}[c+dx]}{b\sqrt{\operatorname{Cos}[c+dx]}}\right)$$

- **Problem 757: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\operatorname{Cos}[c+dx]^2}{\sqrt{\operatorname{Cos}[c+dx]}\,(a+b\operatorname{Cos}[c+dx])^{3/2}}\,dx$$

Optimal (type 4, 421 leaves, 6 steps):

$$\frac{2\left(A b^2+a^2 C\right) \operatorname{Cot}[c+d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}}{a^2 b \sqrt{a+b}\, d}+$$

$$\frac{2(A b-a C) \operatorname{Cot}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}}{a b \sqrt{a+b}\, d}-\frac{1}{b^2 d}$$

$$2 \sqrt{a+b}\, C \operatorname{Cot}[c+d x] \operatorname{EllipticPi}\left[\frac{a+b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}-$$

$$\frac{2\left(A b^2+a^2 C\right) \operatorname{Sin}[c+d x]}{b\left(a^2-b^2\right) d \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

Result (type 4, 1225 leaves):

$$\frac{2 \sqrt{\operatorname{Cos}[c+d x]}\left(A b^2 \operatorname{Sin}[c+d x]+a^2 C \operatorname{Sin}[c+d x]\right)}{a\left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{a(a-b)(a+b) d}$$

$$\left(-\left(4 a\left(a^2 A-A b^2\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a$$

$$(-a A b-a b C)\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-A\,b^2-a^2\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 758: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 308 leaves, 4 steps):

$$-\frac{1}{a^3\sqrt{a+b}\ d}2\left(2\,A\,b^2-a^2\,(A-C)\right)\,\text{Cot}[c+d\,x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{a^2\sqrt{a+b}\ d}2\,(2\,A\,b+a\,(A-C))\,\text{Cot}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\left(A\,b^2+a^2\,C\right)\,\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)\,d\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1269 leaves):

$$\frac{1}{a^2\,(-a+b)\,(a+b)\,d}\Bigg(\Bigg(-\Bigg(4\,a\left(2\,a^2\,A\,b-2\,A\,b^3\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(a^3\,A-2\,a\,A\,b^2-a^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left(b\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)\right)+$$

$$2\left(a^2 A b-2 A b^3-a^2 b C\right)\left(\frac{i\operatorname{Cos}\left[\frac{1}{2}(c+dx)\right]\sqrt{a+b\operatorname{Cos}[c+dx]}\operatorname{EllipticE}\left[i\operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{\operatorname{Cos}[c+dx]}}\right],-\frac{2a}{-a-b}\right]\operatorname{Sec}[c+dx]}{b\sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+dx)\right]^2\operatorname{Sec}[c+dx]}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Sec}[c+dx]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+dx]\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\operatorname{Csc}[c+dx]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+dx])\operatorname{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+dx]}\sqrt{a+b\operatorname{Cos}[c+dx]}\right)-$$

$$\left(a \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\text{Cos}[c+d x]} \sqrt{a+b\,\text{Cos}[c+d x]}\right) +$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b \sqrt{\text{Cos}[c+d x]}}\right)\right) + \frac{\sqrt{\text{Cos}[c+d x]} \sqrt{a+b\,\text{Cos}[c+d x]} \left(-\frac{2\left(A b^3 \text{Sin}[c+d x]+a^2 b\, C\, \text{Sin}[c+d x]\right)}{a^2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d x])} + \frac{2 A\, \text{Tan}[c+d x]}{a^2}\right)}{d}$$

- **Problem 759: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+C\,\text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{5/2}\,(a+b\,\text{Cos}[c+d x])^{3/2}}\, dx$$

Optimal (type 4, 392 leaves, 5 steps):

$$\frac{1}{3 a^4 \sqrt{a+b}\ d} 2 b \left(8 A b^2 - a^2 (5 A - 3 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{3 a^3 \sqrt{a+b}\ d}$$

$$2\left(6 a A b + 8 A b^2 + a^2 (A + 3 C)\right) \text{Cot}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2\left(A b^2 + a^2 C\right) \text{Sin}[c+d x]}{a\left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{3/2} \sqrt{a+b\,\text{Cos}[c+d x]}} - \frac{2\left(4 A b^2 - a^2 (A - 3 C)\right) \sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{3 a^2\left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1327 leaves):

$$\frac{1}{3 a^3 (a-b)(a+b) d} \left(-\left(4 a \left(a^4 A + 7 a^2 A b^2 - 8 A b^4 + 3 a^4 C - 3 a^2 b^2 C\right) \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(5\,a^3\,A\,b-8\,a\,A\,b^3-3\,a^3\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(5\,a^2\,A\,b^2-8\,A\,b^4-3\,a^2\,b^2\,C\right)\,\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\left(A\,b^4\,\text{Sin}[c+d\,x]+a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])}-\frac{10\,A\,b\,\text{Tan}[c+d\,x]}{3\,a^3}+\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a^2}\right)}{d}$$

- **Problem 760: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 494 leaves, 6 steps) :

$$-\frac{1}{5 a^5 \sqrt{a+b}\, d} 2 \left(16 A b^4 - 2 a^2 b^2 (4 A - 5 C) - a^4 (3 A + 5 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{5 a^4 \sqrt{a+b}\, d}$$

$$2 \left(12 a A b^2 + 16 A b^3 + 2 a^2 b (2 A + 5 C) + a^3 (3 A + 5 C)\right) \text{Cot}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{2 \left(A b^2 + a^2 C\right) \text{Sin}[c+d x]}{a \left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{5/2} \sqrt{a+b\,\text{Cos}[c+d x]}} -$$

$$\frac{2 \left(6 A b^2 - a^2 (A - 5 C)\right) \sqrt{a+b\,\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{5 a^2 \left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{5/2}} + \frac{2 b \left(8 A b^2 - a^2 (3 A - 5 C)\right) \sqrt{a+b\,\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{5 a^3 \left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1418 leaves):

$$\frac{1}{5 a^4 (-a+b) (a+b) d}$$

$$\left(-\left(4 a \left(4 a^4 A b + 12 a^2 A b^3 - 16 A b^5 + 10 a^4 b C - 10 a^2 b^3 C\right) \sqrt{\frac{(a+b)\, \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\, \text{Cos}[c+d x]\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b\,\text{Cos}[c+d x]}\right) - 4 a \left(3 a^5 A + 8 a^3 A b^2 - 16 a A b^4 + 5 a^5 C - 10 a^3 b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\, \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\, \text{Cos}[c+d x]\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/ \left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right) -$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right) + 2\left(3\,a^4\,A\,b + 8\,a^2\,A\,b^3 - 16\,A\,b^5 + 5\,a^4\,b\,C - 10\,a^2\,b^3\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}} +\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg) \Big/ \left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)+\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2 \operatorname{Sec}[c+d x] \left(3 a^2 A \operatorname{Sin}[c+d x]+11 A b^2 \operatorname{Sin}[c+d x]+5 a^2 C \operatorname{Sin}[c+d x]\right)}{5 a^4}-\right.$$

$$\frac{2 \left(A b^5 \operatorname{Sin}[c+d x]+a^2 b^3 C \operatorname{Sin}[c+d x]\right)}{a^4 \left(a^2-b^2\right) (a+b \operatorname{Cos}[c+d x])}-$$

$$\frac{6 A b \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{5 a^3}+$$

$$\left.\frac{2 A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{5 a^2}\right)$$

- **Problem 761: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\operatorname{Cos}[c+d x]^{3/2} \left(A+C \operatorname{Cos}[c+d x]^2\right)}{(a+b \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 650 leaves, 8 steps) :

$$\frac{1}{3 a (a-b) b^3 (a+b)^{3/2} d}\left(8 A b^4-15 a^4 C+26 a^2 b^2 C-3 b^4 C\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{3 a (a-b) b^3 (a+b)^{3/2} d}\left(2 a A b^3-6 A b^4+15 a^4 C+5 a^3 b C-21 a^2 b^2 C-3 a b^3 C\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{b^4 d} 5 a \sqrt{a+b}\, C \text{Cot}[c+d x] \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{2 \left(A b^2+a^2 C\right) \text{Cos}[c+d x]^{3/2} \text{Sin}[c+d x]}{3 b \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x])^{3/2}}+\frac{2 \left(3 A b^4-5 a^4 C+a^2 b^2 (A+9 C)\right) \sqrt{\text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 b^2 \left(a^2-b^2\right)^2 d \sqrt{a+b \text{Cos}[c+d x]}}-\frac{\left(8 A b^4-\left(15 a^4-26 a^2 b^2+3 b^4\right) C\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 b^3 \left(a^2-b^2\right)^2 d \sqrt{\text{Cos}[c+d x]}}$$

Result (type 4, 1366 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]} \left(-\frac{2 \left(a A b^2 \text{Sin}[c+d x]+a^3 C \text{Sin}[c+d x]\right)}{3 b^2 \left(-a^2+b^2\right) (a+b \text{Cos}[c+d x])^2}+\frac{4 \left(2 A b^4 \text{Sin}[c+d x]-3 a^4 C \text{Sin}[c+d x]+5 a^2 b^2 C \text{Sin}[c+d x]\right)}{3 b^2 \left(-a^2+b^2\right)^2 (a+b \text{Cos}[c+d x])}\right)+$$

$$\frac{1}{6 (a-b)^2 b^2 (a+b)^2 d}\left(-\left(\left(4 a \left(2 a^2 A b^2-2 A b^4+5 a^4 C-8 a^2 b^2 C+3 b^4 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(-8 a A b^3+4 a^3 b C-12 a b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-8\,A\,b^4+15\,a^4\,C-26\,a^2\,b^2\,C+3\,b^4\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d\,x]\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d\,x]\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\operatorname{Cos}[c+d\,x]}\sqrt{a+b\operatorname{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}\operatorname{Sin}[c+d\,x]}{b\sqrt{\operatorname{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 762: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\operatorname{Cos}[c+d\,x]}\left(A+C\operatorname{Cos}[c+d\,x]^2\right)}{(a+b\operatorname{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 563 leaves, 7 steps):

$$-\frac{1}{3\,a^2\,b^2\sqrt{a+b}\left(a^2-b^2\right)d}2\left(A\,b^4-3\,a^4\,C+a^2\,b^2\,(3\,A+7\,C)\right)\operatorname{Cot}[c+d\,x]\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,(a-b)\,b^2\,(a+b)^{3/2}\,d}2\left(3\,a\,A\,b^2-A\,b^3-3\,a^3\,C-a^2\,b\,C+6\,a\,b^2\,C\right)$$

$$\operatorname{Cot}[c+d\,x]\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^3\,d}$$

$$2\sqrt{a+b}\;C\operatorname{Cot}[c+d\,x]\operatorname{EllipticPi}\left[\frac{a+b}{b},\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{2\left(A\,b^2+a^2\,C\right)\sqrt{\operatorname{Cos}[c+d\,x]}\operatorname{Sin}[c+d\,x]}{3\,b\left(a^2-b^2\right)d\,(a+b\operatorname{Cos}[c+d\,x])^{3/2}}+\frac{2\left(A\,b^4-3\,a^4\,C+a^2\,b^2\,(3\,A+7\,C)\right)\operatorname{Sin}[c+d\,x]}{3\,b^2\left(a^2-b^2\right)^2d\sqrt{\operatorname{Cos}[c+d\,x]}\sqrt{a+b\operatorname{Cos}[c+d\,x]}}$$

Result (type 4, 1388 leaves):

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}$$

$$\left(\frac{2\left(A b^2 \text{Sin}[c+d x]+a^2 C\,\text{Sin}[c+d x]\right)}{3 b\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d x])^2}+\frac{2\left(-3 a^2 A b^2 \text{Sin}[c+d x]-A b^4 \text{Sin}[c+d x]+3 a^4 C\,\text{Sin}[c+d x]-7 a^2 b^2 C\,\text{Sin}[c+d x]\right)}{3 a b\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d x])}\right)-$$

$$\frac{1}{3 a (a-b)^2 b (a+b)^2 d}\left(-\left(4 a\left(a^2 A b^2-A b^4+a^4 C-a^2 b^2 C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\text{Csc}[c+d x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(-3 a^3 A b-a A b^3-a^3 b C-3 a b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\text{Csc}[c+d x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg)+$$

$$2\left(-3a^2Ab^2-Ab^4+3a^4C-7a^2b^2C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+dx)\right]\sqrt{a+b\,\text{Cos}[c+dx]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{\text{Cos}[c+dx]}}\right],-\frac{2a}{-a-b}\right]\text{Sec}[c+dx]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+dx)\right]^2\text{Sec}[c+dx]}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Sec}[c+dx]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\text{Csc}[c+dx]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+dx]\;\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+dx]}\;\text{Sin}[c+dx]}{b\sqrt{\text{Cos}[c+dx]}}\right)\right)$$

- **Problem 763: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+dx]^2}{\sqrt{\text{Cos}[c+dx]}\,(a+b\,\text{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 4, 417 leaves, 5 steps) :

$$\frac{1}{3 a^3 (a-b) (a+b)^{3/2} d}$$

$$4 b \left(3 a^2 A - A b^2 + 2 a^2 C\right) \text{Cot}[c+d x] \,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{1}{3 a^2 \sqrt{a+b} \left(a^2-b^2\right) d} 2 \left(2 A b^2 + 3 a b (A+C) - a^2 (3 A + C)\right) \text{Cot}[c+d x] \,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{2 \left(A b^2 + a^2 C\right) \sqrt{\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \,(a+b\,\text{Cos}[c+d x])^{3/2}} + \frac{4 b \left(A b^2 - a^2 (3 A + 2 C)\right) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right)^2 d \sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 4, 1364 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]} \left(\frac{2 \left(A b^2\,\text{Sin}[c+d x] + a^2 C\,\text{Sin}[c+d x]\right)}{3 a \left(a^2-b^2\right) (a+b\,\text{Cos}[c+d x])^2} + \frac{4 \left(3 a^2 A b^2\,\text{Sin}[c+d x] - A b^4\,\text{Sin}[c+d x] + 2 a^2 b^2 C\,\text{Sin}[c+d x]\right)}{3 a^2 \left(a^2-b^2\right)^2 (a+b\,\text{Cos}[c+d x])}\right) +$$

$$\frac{1}{3 a^2 (a-b)^2 (a+b)^2 d} \left(-\left(4 a \left(3 a^4 A - 5 a^2 A b^2 + 2 A b^4 + a^4 C - a^2 b^2 C\right) \sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right) - 4 a \left(-6 a^3 A b + 2 a A b^3 - 4 a^3 b C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d x]\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\operatorname{Csc}[c+d x]\right.$$

$$\left.\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(b\sqrt{\operatorname{Cos}[c+d x]}\sqrt{a+b\operatorname{Cos}[c+d x]}\right)\Bigg)+$$

$$2\left(-6a^2 A b^2+2 A b^4-4a^2 b^2 C\right)\left(\frac{i\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\operatorname{Cos}[c+d x]}\operatorname{EllipticE}\left[i\operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2a}{-a-b}\right]\operatorname{Sec}[c+d x]}{b\sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2\operatorname{Sec}[c+d x]}\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d x]\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\operatorname{Cos}[c+d x]}\sqrt{a+b\operatorname{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d x]\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x]\operatorname{EllipticPi}\left[-\frac{a}{b},\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d x])\operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right|+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 764: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 449 leaves, 5 steps):

$$\frac{1}{3\,a^4\sqrt{a+b}\,\left(a^2-b^2\right)d}2\left(8\,A\,b^4+3\,a^4\,(A-C)-a^2\,b^2\,(15\,A+C)\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a^3\sqrt{a+b}\,\left(a^2-b^2\right)d}2\left(6\,a\,A\,b^2+8\,A\,b^3-3\,a^3\,(A-C)-a^2\,b\,(9\,A+C)\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\left(A\,b^2+a^2\,C\right)\text{Sin}[c+d\,x]}{3\,a\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}-\frac{4\left(2\,A\,b^4-a^4\,C-a^2\,b^2\,(4\,A+C)\right)\text{Sin}[c+d\,x]}{3\,a^2\left(a^2-b^2\right)^2d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1421 leaves):

$$-\frac{1}{3\,a^3\,(a-b)^2\,(a+b)^2\,d}\left(-\left(4\,a\left(9\,a^4\,A\,b-17\,a^2\,A\,b^3+8\,A\,b^5+a^4\,b\,C-a^2\,b^3\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(3\,a^5\,A-15\,a^3\,A\,b^2+8\,a\,A\,b^4-3\,a^5\,C-a^3\,b^2\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(3\,a^4\,A\,b-15\,a^2\,A\,b^3+8\,A\,b^5-3\,a^4\,b\,C-a^2\,b^3\,C\right)$$

$$\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(-\frac{2\left(A\,b^3\,\text{Sin}[c+d\,x]+a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{3\,a^2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\right.$$

$$\frac{2\left(9\,a^2\,A\,b^3\,\text{Sin}[c+d\,x]-5\,A\,b^5\,\text{Sin}[c+d\,x]+3\,a^4\,b\,C\,\text{Sin}[c+d\,x]+a^2\,b^3\,C\,\text{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}+$$

$$\left.\frac{2\,A\,\text{Tan}[c+d\,x]}{a^3}\right)$$

- **Problem 765: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 549 leaves, 6 steps):

$$-\frac{1}{3 a^5 \sqrt{a+b} \left(a^2-b^2\right) d}4 b \left(8 A b^4+a^4 (4 A-3 C)-a^2 b^2 (14 A-C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{3 a^4 \sqrt{a+b} \left(a^2-b^2\right) d}$$

$$2 \left(12 a A b^3+16 A b^4-2 a^2 b^2 (8 A-C)-a^4 (A+3 C)-a^3 (9 A b-3 b C)\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 \left(A b^2+a^2 C\right) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \text{Cos}[c+d x]^{3/2} (a+b \text{Cos}[c+d x])^{3/2}}+$$

$$\frac{4 \left(5 a^2 A b^2-3 A b^4+2 a^4 C\right) \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \text{Cos}[c+d x]^{3/2} \sqrt{a+b \text{Cos}[c+d x]}}+\frac{2 \left(8 A b^4+a^4 (A-5 C)-a^2 b^2 (13 A-C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1471 leaves) :

$$\frac{1}{3 a^4 (a-b)^2 (a+b)^2 d}$$

$$\left(-\left(4 a \left(a^6 A+15 a^4 A b^2-32 a^2 A b^4+16 A b^6+3 a^6 C-5 a^4 b^2 C+2 a^2 b^4 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(8 a^5 A b-28 a^3 A b^3+16 a A b^5-6 a^5 b C+2 a^3 b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(8\,a^4\,A\,b^2-28\,a^2\,A\,b^4+16\,A\,b^6-6\,a^4\,b^2\,C+2\,a^2\,b^4\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2\left(A\,b^4\,\mathrm{Sin}[c+d\,x]+a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])^2}+\right.$$

$$\frac{4\left(6\,a^2\,A\,b^4\,\mathrm{Sin}[c+d\,x]-4\,A\,b^6\,\mathrm{Sin}[c+d\,x]+3\,a^4\,b^2\,C\,\mathrm{Sin}[c+d\,x]-a^2\,b^4\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^4\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])}-$$

$$\frac{16\,A\,b\,\mathrm{Tan}[c+d\,x]}{3\,a^4}+$$

$$\left.\frac{2\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{3\,a^3}\right)$$

- **Problem 766: Result more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[c+d\,x]^m\,(a+b\,\mathrm{Cos}[c+d\,x])^2\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 5, 318 leaves, 6 steps):

$$\frac{\left(2\,a^2\,C+b^2\,(C\,(3+m)+A\,(4+m))\right)\mathrm{Cos}[c+d\,x]^{1+m}\,\mathrm{Sin}[c+d\,x]}{d\,(2+m)\,(4+m)}+\frac{2\,a\,b\,C\,\mathrm{Cos}[c+d\,x]^{2+m}\,\mathrm{Sin}[c+d\,x]}{d\,(3+m)\,(4+m)}+$$

$$\frac{C\,\mathrm{Cos}[c+d\,x]^{1+m}\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sin}[c+d\,x]}{d\,(4+m)}-\left(\left(a^2\,(4+m)\,(C\,(1+m)+A\,(2+m))+b^2\,(1+m)\,(C\,(3+m)+A\,(4+m))\right)\right.$$

$$\left.\mathrm{Cos}[c+d\,x]^{1+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]\right)\Bigg/\left(d\,(1+m)\,(2+m)\,(4+m)\sqrt{\mathrm{Sin}[c+d\,x]^2}\right)-$$

$$\frac{2\,a\,b\,(C\,(2+m)+A\,(3+m))\,\mathrm{Cos}[c+d\,x]^{2+m}\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\mathrm{Cos}[c+d\,x]^2\right]\mathrm{Sin}[c+d\,x]}{d\,(2+m)\,(3+m)\sqrt{\mathrm{Sin}[c+d\,x]^2}}$$

Result (type 5, 664 leaves):

$$\frac{1}{8\,d}\operatorname{Cos}[c+d\,x]^{1+m}\operatorname{Csc}[c+d\,x]\left(-\frac{b^2\,C\,\text{Hypergeometric2F1}\left[-\frac{3}{2},\frac{1+m}{2},\frac{3+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{1+m}+\frac{4\,\left(A\,b^2+\left(a^2+b^2\right)C\right)\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{1+m}+\frac{12\,a\,b\,C\operatorname{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{2+m}+\frac{6\,b^2\,C\operatorname{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{3+m}-\frac{8\,a^2\,A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{1+m}-\frac{4\,A\,b^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{1+m}-\frac{4\,a^2\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{1+m}-\frac{3\,b^2\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{1+m}-\frac{16\,a\,A\,b\operatorname{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{2+m}-\frac{12\,a\,b\,C\operatorname{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{2+m}-\frac{4\,A\,b^2\operatorname{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{3+m}-\frac{4\,a^2\,C\operatorname{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{3+m}-\frac{4\,b^2\,C\operatorname{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{3+m}-\frac{4\,a\,b\,C\operatorname{Cos}[c+d\,x]^3\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{4+m}{2},\frac{6+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{4+m}-\frac{b^2\,C\operatorname{Cos}[c+d\,x]^4\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{5+m}{2},\frac{7+m}{2},\operatorname{Cos}[c+d\,x]^2\right]}{5+m}\right)\sqrt{\operatorname{Sin}[c+d\,x]^2}$$

## Problem 768: Result more than twice size of optimal antiderivative.

$$\int\frac{\operatorname{Cos}[c+d\,x]^m\left(A+C\operatorname{Cos}[c+d\,x]^2\right)}{a+b\operatorname{Cos}[c+d\,x]}\,dx$$

Optimal (type 6, 353 leaves, 8 steps):

$$\frac{1}{b^2 (a^2-b^2) d} a (A b^2 + a^2 C) \text{AppellF1}\left[\frac{1}{2}, \frac{1-m}{2}, 1, \frac{3}{2}, \text{Sin}[c+d x]^2, -\frac{b^2 \text{Sin}[c+d x]^2}{a^2-b^2}\right] \text{Cos}[c+d x]^{-1+m} \left(\text{Cos}[c+d x]^2\right)^{\frac{1-m}{2}} \text{Sin}[c+d x] - \frac{1}{b (a^2-b^2) d} (A b^2 + a^2 C) \text{AppellF1}\left[\frac{1}{2}, -\frac{m}{2}, 1, \frac{3}{2}, \text{Sin}[c+d x]^2, -\frac{b^2 \text{Sin}[c+d x]^2}{a^2-b^2}\right] \text{Cos}[c+d x]^m \left(\text{Cos}[c+d x]^2\right)^{-m/2} \text{Sin}[c+d x] + \frac{a C \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{b^2 d (1+m) \sqrt{\text{Sin}[c+d x]^2}} - \frac{C \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]}{b d (2+m) \sqrt{\text{Sin}[c+d x]^2}}$$

Result (type 6, 10 459 leaves) :

$$\Bigg(\left(\frac{A \text{Cos}[c+d x]^m}{a+b \text{Cos}[c+d x]} + \frac{C \text{Cos}[c+d x]^m}{2 (a+b \text{Cos}[c+d x])} + \frac{C \text{Cos}[c+d x]^m \text{Cos}[2 (c+d x)]}{2 (a+b \text{Cos}[c+d x])}\right) \text{Tan}[c+d x]$$

$$\Bigg(-\frac{a C \text{Hypergeometric2F1}\left[\frac{1}{2}, 1+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right]}{b^2} + \frac{A \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right]}{b} + \frac{a^2 C \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right]}{b^3} + \frac{C \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3+m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right]}{b} +$$

$$\left(3 a^2 (a^2-b^2) (A b^2 + a^2 C) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right) \Big/$$

$$\Bigg(b^3 \Bigg(-3 (a^2-b^2) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + (a^2-b^2) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[c+d x]^2\Bigg)$$

$$\left(-b^2 + a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\Bigg) - \left(3 a A (a^2-b^2) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right) \Big/$$

$$\Bigg(\Bigg(-3 (a^2-b^2) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + (a^2-b^2) m \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[c+d x]^2\Bigg)$$

$$\left(-b^2 + a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\Bigg) + \left(3 a^3 C \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right) \Big/$$

$$\Bigg(\Bigg(-3 (a^2-b^2) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2,$$

$$
\begin{aligned}
&-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)m\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)\\
&\left(-b^2+a^2\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)-\Big(3\,a^5\,C\,\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-m/2}\Big)\Big/\\
&\Big(b^2\Big(-3\left(a^2-b^2\right)\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\\
&\quad\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\\
&\quad\quad\left(a^2-b^2\right)m\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)\left(-b^2+a^2\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)\Big)\Big)\Big/\\
&\Big(d\,\Big(\mathrm{Sec}[c+d\,x]^2\Big(-\frac{a\,C\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2\right]}{b^2}+\frac{A\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2\right]}{b}+\\
&\quad\frac{a^2\,C\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2\right]}{b^3}+\frac{C\,\mathrm{Hypergeometric2F1}\left[\frac{1}{2},\frac{3+m}{2},\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2\right]}{b}+\\
&\quad\Big(3\,a^2\left(a^2-b^2\right)\left(A\,b^2+a^2\,C\right)\mathrm{AppellF1}\Big[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Big)\Big/\\
&\quad\Big(b^3\Big(-3\left(a^2-b^2\right)\mathrm{AppellF1}\Big[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\\
&\quad\quad\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\\
&\quad\quad\quad\left(a^2-b^2\right)(-1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)\left(-b^2+a^2\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)-\\
&\quad\Big(3\,a\,A\left(a^2-b^2\right)\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-m/2}\Big)\Big/\Big(\Big(-3\left(a^2-b^2\right)\\
&\quad\quad\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\\
&\quad\quad\left(a^2-b^2\right)m\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)\left(-b^2+a^2\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)+\\
&\quad\Big(3\,a^3\,C\,\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-m/2}\Big)\Big/\Big(\Big(-3\left(a^2-b^2\right)\\
&\quad\quad\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+
\end{aligned}
$$

$$\left(a^2-b^2\right) m \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{2+m}{2}, 1, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}]) \,\text{Tan}[c+d x]^2) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right))\, -$$

$$(3 a^5 C \,\text{AppellF1}[\tfrac{1}{2}, \tfrac{m}{2}, 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, \tfrac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}] \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}) \Big/ (b^2 (-3 \left(a^2-b^2\right)$$

$$\text{AppellF1}[\tfrac{1}{2}, \tfrac{m}{2}, 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] + (2 a^2 \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{m}{2}, 2, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] +$$

$$\left(a^2-b^2\right) m \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{2+m}{2}, 1, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}]) \,\text{Tan}[c+d x]^2) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right))) +$$

$$\text{Tan}[c+d x] (-(6 a^4 \left(a^2-b^2\right) \left(A b^2+a^2 C\right) \text{AppellF1}[\tfrac{1}{2}, \tfrac{1}{2} (-1+m), 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, \tfrac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}] \,\text{Sec}[c+d x]^2$$

$$\text{Tan}[c+d x] \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}) \Big/ (b^3 (-3 \left(a^2-b^2\right) \text{AppellF1}[\tfrac{1}{2}, \tfrac{1}{2} (-1+m), 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] +$$

$$(2 a^2 \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{1}{2} (-1+m), 2, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] + \left(a^2-b^2\right) (-1+m)$$

$$\text{AppellF1}[\tfrac{3}{2}, \tfrac{1+m}{2}, 1, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}]) \,\text{Tan}[c+d x]^2) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^2) +$$

$$(6 a^3 A \left(a^2-b^2\right) \text{AppellF1}[\tfrac{1}{2}, \tfrac{m}{2}, 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] \,\text{Sec}[c+d x]^2 \,\text{Tan}[c+d x] \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}) \Big/$$

$$((-3 \left(a^2-b^2\right) \text{AppellF1}[\tfrac{1}{2}, \tfrac{m}{2}, 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] +$$

$$(2 a^2 \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{m}{2}, 2, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] +$$

$$\left(a^2-b^2\right) m \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{2+m}{2}, 1, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}]) \,\text{Tan}[c+d x]^2) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^2) -$$

$$(6 a^5 C \,\text{AppellF1}[\tfrac{1}{2}, \tfrac{m}{2}, 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, \tfrac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}] \,\text{Sec}[c+d x]^2 \,\text{Tan}[c+d x] \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}) \Big/$$

$$((-3 \left(a^2-b^2\right) \text{AppellF1}[\tfrac{1}{2}, \tfrac{m}{2}, 1, \tfrac{3}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] +$$

$$(2 a^2 \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{m}{2}, 2, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}] +$$

$$\left(a^2-b^2\right) m \,\text{AppellF1}[\tfrac{3}{2}, \tfrac{2+m}{2}, 1, \tfrac{5}{2}, -\text{Tan}[c+d x]^2, -\tfrac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}]) \,\text{Tan}[c+d x]^2) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^2) +$$

$$\left(6\, a^7\, C\, \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right] \text{Sec}[c+d\,x]^2\, \text{Tan}[c+d\,x]\, \left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right) \Big/$$

$$\left(b^2 \left(-3\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.\right.$$

$$\left(2\, a^2\, \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.$$

$$\left.\left.\left.\left(a^2-b^2\right) m\, \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d\,x]^2\right) \left(-b^2+a^2\, \left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right) +$$

$$\left(6\, a^2\, \left(a^2-b^2\right)\, \left(A\, b^2+a^2\, C\right)\, \left(\frac{1}{2}-\frac{m}{2}\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}\,(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right] \text{Sec}[c+d\,x]^2\right.$$

$$\left.\text{Tan}[c+d\,x]\, \left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right) \Big/ \left(b^3 \left(-3\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}\,(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.\right.$$

$$\left(2\, a^2\, \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}\,(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\, (-1+m)\, \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d\,x]^2\right) \left(-b^2+a^2\, \left(1+\text{Tan}[c+d\,x]^2\right)\right)\right) +$$

$$\left(3\, a^2\, \left(a^2-b^2\right)\, \left(A\, b^2+a^2\, C\right)\, \left(-\frac{1}{3}\,(-1+m)\, \text{AppellF1}\left[\frac{3}{2}, 1+\frac{1}{2}\,(-1+m), 1, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right] \text{Sec}[c+d\,x]^2\, \text{Tan}[c+d\,x] + \right.\right.$$

$$\left. 1 \Big/ \left(3\, \left(-a^2+b^2\right)\right) 2\, a^2\, \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}\,(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right] \text{Sec}[c+d\,x]^2\, \text{Tan}[c+d\,x]\right)$$

$$\left.\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right) \Big/ \left(b^3 \left(-3\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}\,(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.\right.$$

$$\left(2\, a^2\, \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}\,(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\, (-1+m)\, \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d\,x]^2\right) \left(-b^2+a^2\, \left(1+\text{Tan}[c+d\,x]^2\right)\right)\right) +$$

$$\left(3\, a\, A\, \left(a^2-b^2\right) m\, \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] \text{Sec}[c+d\,x]^2\, \text{Tan}[c+d\,x]\, \left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right) \Big/$$

$$\left(\left(-3\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.\right.$$

$$\left(2\, a^2\, \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right] + \right.$$

$$\left.\left.\left(a^2-b^2\right) m\, \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d\,x]^2, -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d\,x]^2\right) \left(-b^2+a^2\, \left(1+\text{Tan}[c+d\,x]^2\right)\right) -$$

$$\left(3\,a^3\,C\,m\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$
$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left.\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$
$$\left(3\,a^5\,C\,m\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$
$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left.\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)-$$
$$\left(3\,a\,A\left(a^2-b^2\right)\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$
$$\left.\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$
$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)$$
$$\left.\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+\left(3\,a^3\,C\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\right.\right.$$
$$\left.\left.\text{Tan}[c+d\,x]+\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(-a^2+b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$
$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.$$

$$-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)$$

$$\left(-b^2+a^2\,\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)-\Big(3\,a^5\,C\,\Big(-\frac{1}{3}\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+\frac{m}{2},\,1,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]+$$

$$\frac{2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\,\left(-a^2+b^2\right)}\Big)\,\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-m/2}\Big)\Big/\Big(b^2\,\Big(-3\,\left(a^2-b^2\right)$$

$$\mathrm{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)+$$

$$\frac{1}{b}C\,\mathrm{Csc}[c+d\,x]\,\mathrm{Sec}[c+d\,x]\,\Big(-\mathrm{Hypergeometric2F1}\Big[\frac{1}{2},\,\frac{3+m}{2},\,\frac{3}{2},\,-\mathrm{Tan}[c+d\,x]^2\Big]+\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{\frac{1}{2}(-3-m)}\Big)+\frac{1}{b}$$

$$A\,\mathrm{Csc}[c+d\,x]\,\mathrm{Sec}[c+d\,x]\,\Big(-\mathrm{Hypergeometric2F1}\Big[\frac{1}{2},\,\frac{1+m}{2},\,\frac{3}{2},\,-\mathrm{Tan}[c+d\,x]^2\Big]+\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{\frac{1}{2}(-1-m)}\Big)+\frac{1}{b^3}$$

$$a^2\,C\,\mathrm{Csc}[c+d\,x]\,\mathrm{Sec}[c+d\,x]\,\Big(-\mathrm{Hypergeometric2F1}\Big[\frac{1}{2},\,\frac{1+m}{2},\,\frac{3}{2},\,-\mathrm{Tan}[c+d\,x]^2\Big]+\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{\frac{1}{2}(-1-m)}\Big)-$$

$$\frac{1}{b^2}a\,C\,\mathrm{Csc}[c+d\,x]\,\mathrm{Sec}[c+d\,x]\,\Big(-\mathrm{Hypergeometric2F1}\Big[\frac{1}{2},\,1+\frac{m}{2},\,\frac{3}{2},\,-\mathrm{Tan}[c+d\,x]^2\Big]+\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\Big)-$$

$$\Big(3\,a^2\,\left(a^2-b^2\right)\,\left(A\,b^2+a^2\,C\right)\,\mathrm{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]$$

$$\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Big(2\,\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$3\,\left(a^2-b^2\right)\,\Big(-\frac{1}{3}\,(-1+m)\,\mathrm{AppellF1}\Big[\frac{3}{2},\,1+\frac{1}{2}\,(-1+m),\,1,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$\frac{1}{3\,\left(a^2-b^2\right)}2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\Big)+$$

$$\mathrm{Tan}[c+d\,x]^2\,\Big(2\,a^2\,\Big(-\frac{3}{5}\,(-1+m)\,\mathrm{AppellF1}\Big[\frac{5}{2},\,1+\frac{1}{2}\,(-1+m),\,2,\,\frac{7}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$\frac{1}{5\,\left(a^2-b^2\right)}12\,a^2\,\mathrm{AppellF1}\Big[\frac{5}{2},\,\frac{1}{2}\,(-1+m),\,3,\,\frac{7}{2},\,-\mathrm{Tan}[c+d\,x]^2,\,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\Big)+$$

$$\left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(b^3\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),\right.\right.\right.\right.$$

$$2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\right.$$

$$\left.\left.\left.\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$

$$\left(3\,a\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\right.\right.\right.\right.$$

$$\left.\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Big)$$

$$\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-3\left(a^2-b^2\right)\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right.$$

$$\left.\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right) m\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)^2$$

$$\left(-b^2+a^2\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)-\Big(3\,a^3\,C\,\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-m/2}$$

$$\Big(2\,\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right) m\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$3\left(a^2-b^2\right)\Big(-\frac{1}{3}\,m\,\mathrm{AppellF1}\Big[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$\frac{2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\Big)+$$

$$\mathrm{Tan}[c+d\,x]^2\,\Big(2\,a^2\,\Big(-\frac{3}{5}\,m\,\mathrm{AppellF1}\Big[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\mathrm{AppellF1}\Big[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\Big)+$$

$$\left(a^2-b^2\right) m\,\Big(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\mathrm{AppellF1}\Big[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]-$$

$$\frac{3}{5}\,(2+m)\,\mathrm{AppellF1}\Big[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\Big)\Big)\Big)\Big)\Big)\Big/$$

$$\Big(\Big(-3\left(a^2-b^2\right)\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,$$

$$-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+\left(a^2-b^2\right) m\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\mathrm{Tan}[c+d\,x]^2\Big)^2$$

$$\left(-b^2+a^2\left(1+\mathrm{Tan}[c+d\,x]^2\right)\right)\Big)+\Big(3\,a^5\,C\,\mathrm{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\mathrm{Tan}[c+d\,x]^2,\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\left(1+\mathrm{Tan}[c+d\,x]^2\right)^{-m/2}$$

$$\Big(2\,\Big(2\,a^2\,\mathrm{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\mathrm{Tan}[c+d\,x]^2,-\frac{a^2\,\mathrm{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right) m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3} m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{3}{5} m\,\text{AppellF1}\left[\frac{5}{2},\,1+\frac{m}{2},\,2,\,\frac{7}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\,\frac{m}{2},\,3,\,\frac{7}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right) m\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\,\frac{2+m}{2},\,2,\,\frac{7}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},\,1+\frac{2+m}{2},\,1,\,\frac{7}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\right.\right.\right.\right.$$

$$-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Bigg]+\left(a^2-b^2\right) m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\right.$$

$$\left.\left.\left.\left.-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)^2\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)\right)\right)$$

- **Problem 769: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 6, 514 leaves, 9 steps):

$$\frac{1}{b^2 \left(a^2-b^2\right)^2 d}\left(A\, b^4\, m-a^4\, C\, (1+m)+a^2\, b^2\, (A-A\, m+C\, (2+m))\right) \text{AppellF1}\left[\frac{1}{2},\frac{1-m}{2},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\, \text{Sin}[c+d\,x]^2}{a^2-b^2}\right]$$

$$\text{Cos}[c+d\,x]^{-1+m}\left(\text{Cos}[c+d\,x]^2\right)^{\frac{1-m}{2}} \text{Sin}[c+d\,x]-\frac{1}{a\, b \left(a^2-b^2\right)^2 d}\left(A\, b^4\, m-a^4\, C\, (1+m)+a^2\, b^2\, (A-A\, m+C\, (2+m))\right)$$

$$\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\, \text{Sin}[c+d\,x]^2}{a^2-b^2}\right] \text{Cos}[c+d\,x]^m \left(\text{Cos}[c+d\,x]^2\right)^{-m/2} \text{Sin}[c+d\,x]+$$

$$\frac{\left(A\, b^2+a^2\, C\right) \text{Cos}[c+d\,x]^{1+m}\, \text{Sin}[c+d\,x]}{a \left(a^2-b^2\right) d\, (a+b\, \text{Cos}[c+d\,x])}-\frac{\left(a^2\, C\, (1+m)-b^2\, (C-A\, m)\right) \text{Cos}[c+d\,x]^{1+m}\, \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right] \text{Sin}[c+d\,x]}{b^2 \left(a^2-b^2\right) d\, (1+m) \sqrt{\text{Sin}[c+d\,x]^2}}+$$

$$\frac{\left(A\, b^2+a^2\, C\right) (1+m)\, \text{Cos}[c+d\,x]^{2+m}\, \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right] \text{Sin}[c+d\,x]}{a\, b \left(a^2-b^2\right) d\, (2+m) \sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 17 999 leaves):

$$\Bigg(\bigg(\frac{A\, \text{Cos}[c+d\,x]^m}{(a+b\, \text{Cos}[c+d\,x])^2}+\frac{C\, \text{Cos}[c+d\,x]^m}{2\, (a+b\, \text{Cos}[c+d\,x])^2}+\frac{C\, \text{Cos}[c+d\,x]^m\, \text{Cos}[2\, (c+d\,x)]}{2\, (a+b\, \text{Cos}[c+d\,x])^2}\bigg)$$

$$\Bigg(-\frac{2\, a\, C\, \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right] \text{Tan}[c+d\,x]}{b^3}+\frac{C\, \text{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right] \text{Tan}[c+d\,x]}{b^2}-$$

$$\Bigg(6\, A\, b^2 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right] \text{Tan}[c+d\,x] \left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Bigg)\Big/$$

$$\Bigg(\bigg(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\bigg(\left(a^2-b^2\right) m\, \text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$4\, a^2\, \text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\bigg) \text{Tan}[c+d\,x]^2\bigg) \left(b^2-a^2 \left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Bigg)-$$

$$\Bigg(6\, a^2 \left(a^2-b^2\right) C\, \text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right] \text{Tan}[c+d\,x] \left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Bigg)\Big/$$

$$\Bigg(\bigg(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\bigg(\left(a^2-b^2\right) m\, \text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$4\, a^2\, \text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\, \text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\bigg) \text{Tan}[c+d\,x]^2\bigg) \left(b^2-a^2 \left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Bigg)+$$

$$\Bigg(6\,a\,A\,b\,\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Bigg)\Big/$$

$$\Bigg(\Bigg(-3\,\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1+m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Bigg)+$$

$$\Bigg(6\,a^3\,\left(a^2-b^2\right)C\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Bigg)\Big/$$

$$\Bigg(b\,\Bigg(-3\,\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(4\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1+m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Bigg)-$$

$$\Bigg(6\,a^3\,\left(a^2-b^2\right)C\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Bigg)\Big/$$

$$\Bigg(b^3\,\Bigg(-3\,\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)-$$

$$\Bigg(3\,A\,\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Bigg)\Big/$$

$$\Bigg(\Bigg(-3\,\left(a^2-b^2\right)\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(a^2-b^2\right)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)+$$

$$\Bigg(3\,a^2\,\left(a^2-b^2\right)C\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Bigg)\Big/$$

$$\left(b^2 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\right)\right) \Big/$$

$$\left(d \left(-\frac{2 a C \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{2}+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] \text{Sec}[c+d x]^2}{b^3}+\frac{C \text{Hypergeometric2F1}\left[\frac{1}{2}, 1+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] \text{Sec}[c+d x]^2}{b^2}-\right.\right.$$

$$\left(24 a^2 A b^2 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2 \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right) \Big/$$
$$\left(\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(\left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(b^2-a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^3\right)-$$
$$\left(24 a^4 \left(a^2-b^2\right) C \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2 \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right) \Big/$$
$$\left(\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(\left(a^2-b^2\right) m \text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(b^2-a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^3\right)+$$
$$\left(24 a^3 A b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2 \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right) \Big/$$
$$\left(\left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left(a^2-b^2\right) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(b^2-a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^3\right)+$$

$$\left(24\,a^5\,\left(a^2-b^2\right)\,C\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^3\right)+$$

$$\left(6\,A\,b^2\,\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$

$$\left(\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)+$$

$$\left(6\,a^2\,\left(a^2-b^2\right)\,C\,m\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$

$$\left(\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)-$$

$$\left(6\,A\,b^2\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(b^2-a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)-$$

$$\left(6\,a^2\,\left(a^2-b^2\right)\,C\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)-$$

$$\left(6\,A\,b^2\left(a^2-b^2\right)\text{Tan}[c+d\,x]\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)-$$

$$\left(6\,a^2\left(a^2-b^2\right)C\,\text{Tan}[c+d\,x]\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)+$$

$$\left(12\,a\,A\,b\left(a^2-b^2\right)\left(\frac{1}{2}-\frac{m}{2}\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)\Big/\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Big)+$$

$$\Big(12\,a^3\left(a^2-b^2\right)C\left(\frac{1}{2}-\frac{m}{2}\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2$$

$$\left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\Big)\Big/\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Big)+$$

$$\Big(6\,a\,A\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Big)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Big)+$$

$$\Big(6\,a^3\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Big)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Big)+$$

$$\Big(6\,a\,A\,b\left(a^2-b^2\right)\text{Tan}[c+d\,x]\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\Big)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(b^2-a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)+$$
$$\left(6a^3\left(a^2-b^2\right)C\,\text{Tan}[c+d x]\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,\frac{a^2\,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]+\right.\right.$$
$$\left.\left.\frac{4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d x]^2,\frac{a^2\,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3\left(-a^2+b^2\right)}\right)\left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$
$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(b^2-a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)+$$
$$\left(12a^5\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d x]^2,\frac{a^2\,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]^2\left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$
$$\left(b^3\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)+$$
$$\left(6a^2A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]^2\left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right)\Big/$$
$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)-$$

$$\left(6 a^4 \left(a^2-b^2\right) C \,\text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2 \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right) \Big/$$

$$\left(b^2 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)^2\right) -$$

$$\left(12 a^3 \left(a^2-b^2\right) C \left(\frac{1}{2}-\frac{m}{2}\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]^2 \left(1+\text{Tan}[c+d x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right) \Big/ \left(b^3 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right)(-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\right) -$$

$$\left(6 a^3 \left(a^2-b^2\right) C \,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right) \Big/$$

$$\left(b^3 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right)(-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\right) -$$

$$\left(6 a^3 \left(a^2-b^2\right) C \,\text{Tan}[c+d x] \left(-\frac{1}{3}(-1+m) \text{AppellF1}\left[\frac{3}{2}, 1+\frac{1}{2}(-1+m), 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] + \frac{2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3\left(-a^2+b^2\right)}\right) \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right) \Big/$$

$$\left(b^3 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \right.\right.\right.$$

$$\left(a^2-b^2\right)\ (-1+m)\ \text{AppellF1}\left[\frac{3}{2},\ \frac{1+m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\ \text{Tan}[c+d\,x]^2\Big)\ \left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Big)+$$

$$\left(3\,A\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$

$$\Bigg(\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\ \frac{2+m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\ \text{Tan}[c+d\,x]^2\Bigg)\ \left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)-$$

$$\left(3\,a^2\left(a^2-b^2\right)C\,m\,\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$

$$\Bigg(b^2\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\ \frac{2+m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\ \text{Tan}[c+d\,x]^2\Bigg)\ \left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)-$$

$$\left(3\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\Bigg(\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\ \frac{2+m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\ \text{Tan}[c+d\,x]^2\Bigg)\ \left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)+$$

$$\left(3\,a^2\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ \frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\Bigg(b^2\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\ \frac{m}{2},\ 1,\ \frac{3}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\ \frac{m}{2},\ 2,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\ \frac{2+m}{2},\ 1,\ \frac{5}{2},\ -\text{Tan}[c+d\,x]^2,\ -\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\ \text{Tan}[c+d\,x]^2\Bigg)\ \left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)-$$

$$\left(3\,A\,\left(a^2-b^2\right)\,\text{Tan}[c+d\,x]\,\left(-\frac{1}{3}\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,\left(a^2-b^2\right)}\right)\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$

$$\left(3\,a^2\,\left(a^2-b^2\right)\,C\,\text{Tan}[c+d\,x]\,\left(-\frac{1}{3}\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,\left(-a^2+b^2\right)}\right)\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(b^2\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+\frac{C\,\text{Sec}[c+d\,x]^2\,\left(-\text{Hypergeometric2F1}\left[\frac{1}{2},\,1+\frac{m}{2},\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2\right]+\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)}{b^2}-$$

$$\frac{2\,a\,C\,\text{Sec}[c+d\,x]^2\,\left(-\text{Hypergeometric2F1}\left[\frac{1}{2},\,\frac{1}{2}+\frac{m}{2},\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2\right]+\left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)}{b^3}+$$

$$\left(6\,A\,b^2\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,2,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Tan}[c+d\,x]\right.$$

$$\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\,\left(2\,\left(\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left.4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{m}{2},\,3,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\frac{4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3\left(a^2-b^2\right)}\right)+$$

$$\text{Tan}[c+d x]^2\left(\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}12a^2\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\frac{6}{5}\left(1+\frac{m}{2}\right)\text{AppellF1}\left[\frac{5}{2},2+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+4a^2\left(-\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\frac{18a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},4,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{5\left(a^2-b^2\right)}\right)\right)\right)\right)\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)^2\left(b^2-a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)+\left(6a^2\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Tan}[c+d x]\right.$$

$$\left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\left(2\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\frac{4a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3\left(a^2-b^2\right)}\right)+$$

$$\text{Tan}[c+d\,x]^2\left(\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{6}{5}\left(1+\frac{m}{2}\right)\text{AppellF1}\left[\frac{5}{2},2+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$4\,a^2\left(-\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\left.\frac{18\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},4,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\left(a^2-b^2\right)}\right)\right)\right)\right)\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},2,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},2,\frac{5}{2},\right.\right.\right.\right.$$

$$\left.\left.\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+4\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},3,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2$$

$$\left.\left(b^2-a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)+\left(6\,a^3\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\right.$$

$$\text{Tan}[c+d\,x]\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{3}{5}(-1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1+m),2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1+m),3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\right)\Big/$$

$$\left(b^3 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right)(-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right)^2 \left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)\right) - \left(6 a A b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Tan}[c+d x] \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}} \left(2 \left(4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right)(-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Sec}[c+d x]^2 \text{Tan}[c+d x] - 3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m) \text{AppellF1}\left[\frac{3}{2}, 1+\frac{1}{2}(-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] - \frac{1}{3\left(a^2-b^2\right)} 4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\right) + \text{Tan}[c+d x]^2 \left(4 a^2 \left(-\frac{3}{5}(-1+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{1}{2}(-1+m), 3, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] - \frac{1}{5\left(a^2-b^2\right)} 18 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{1}{2}(-1+m), 4, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\right) + \left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)} 12 a^2 \text{AppellF1}\left[\frac{5}{2}, \frac{1+m}{2}, 3, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] - \frac{3}{5}(1+m) \text{AppellF1}\left[\frac{5}{2}, 1+\frac{1+m}{2}, 2, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\right)\right)\right)\right) \Big/$$

$$\left(\left(\left(-3\left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right)(-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right)^2 \left(b^2-a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right) - \left(6 a^3 \left(a^2-b^2\right) C \,\text{AppellF1}\left[\frac{1}{2}, \frac{1}{2}(-1+m), 2, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Tan}[c+d x] \left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}} \left(2 \left(4 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2}(-1+m), 3, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right)(-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -\right.\right.$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}4 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\text{Tan}[c+d x]^2\left(4 a^2\left(-\frac{3}{5}(-1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1+m),3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}18 a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1+m),4,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}12 a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)\right)\right)\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),2,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(4 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),3,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)^2$$

$$\left.\left(b^2-a^2\left(1+\text{Tan}[c+d x]^2\right)\right)^2\right)+\left(3 A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Tan}[c+d x]\right.$$

$$\left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\left(2\left(2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\frac{2 a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{3\left(a^2-b^2\right)}\right)+$$

$$\text{Tan}[c+d x]^2\left(2 a^2\left(-\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.\right.$$

$$\left.\frac{12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\,(a^2-b^2)}\right)+$$

$$(a^2-b^2)\,m\left(-\frac{1}{5\,(a^2-b^2)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}\,(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(\left(-3\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+(a^2-b^2)\,m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)^2$$

$$\left.\left(-b^2+a^2\,(1+\text{Tan}[c+d\,x]^2)\right)\right)-\left(3\,a^2\,(a^2-b^2)\,C\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Tan}[c+d\,x]\right.$$

$$(1+\text{Tan}[c+d\,x]^2)^{-m/2}\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left.(a^2-b^2)\,m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\,(a^2-b^2)\left(-\frac{1}{3}\,m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,(a^2-b^2)}\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{3}{5}\,m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\,(a^2-b^2)}\right)+$$

$$(a^2-b^2)\,m\left(-\frac{1}{5\,(a^2-b^2)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)\Bigg)\Bigg)\Bigg)\Big/$$

$$\Bigg(b^2\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},\right.$$

$$\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},\right.$$

$$\left.\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Bigg)^2\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)\Bigg)$$

## Problem 773: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\text{Cos}[c+d\,x])\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 3, 35 leaves, 5 steps):

$$(b\,B+a\,C)\,x+\frac{a\,B\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{b\,C\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 104 leaves):

$$b\,B\,x+a\,C\,x-\frac{a\,B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{b\,C\,\text{Cos}[d\,x]\,\text{Sin}[c]}{d}+\frac{b\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}$$

## Problem 774: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\text{Cos}[c+d\,x])\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 35 leaves, 5 steps):

$$b\,C\,x+\frac{(b\,B+a\,C)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{d}+\frac{a\,B\,\text{Tan}[c+d\,x]}{d}$$

Result (type 3, 159 leaves):

$$b\,C\,x-\frac{b\,B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}-\frac{a\,C\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+$$

$$\frac{b\,B\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,C\,\text{Log}\left[\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]}{d}+\frac{a\,B\,\text{Tan}[c+d\,x]}{d}$$

## Problem 775: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\text{Cos}[c+d\,x])\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 3, 61 leaves, 7 steps):

$$\frac{(a B+2 b C) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 d}+\frac{(b B+a C) \text{Tan}[c+d x]}{d}+\frac{a B \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 d}$$

Result (type 3, 164 leaves):

$$\frac{1}{4 d}\left(-2 (a B+2 b C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+2 a B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+4 b C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\frac{a B}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}-\frac{a B}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+4 (b B+a C) \text{Tan}[c+d x]\right)$$

## Problem 777: Result more than twice size of optimal antiderivative.

$$\int (a+b \text{Cos}[c+d x]) \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^6 \, dx$$

Optimal (type 3, 114 leaves, 8 steps):

$$\frac{(3 a B+4 b C) \text{ArcTanh}[\text{Sin}[c+d x]]}{8 d}+\frac{(b B+a C) \text{Tan}[c+d x]}{d}+\frac{(3 a B+4 b C) \text{Sec}[c+d x] \text{Tan}[c+d x]}{8 d}+\frac{a B \text{Sec}[c+d x]^3 \text{Tan}[c+d x]}{4 d}+\frac{(b B+a C) \text{Tan}[c+d x]^3}{3 d}$$

Result (type 3, 403 leaves):

$$-\frac{3 a B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}-\frac{b C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{3 a B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{8 d}+\frac{b C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{a B}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}+\frac{3 a B}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{b C}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}-\frac{a B}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^4}-\frac{3 a B}{16 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}-\frac{b C}{4 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{2 b B \text{Tan}[c+d x]}{3 d}+\frac{2 a C \text{Tan}[c+d x]}{3 d}+\frac{b B \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}+\frac{a C \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 d}$$

## Problem 783: Result more than twice size of optimal antiderivative.

$$\int (a+b \text{Cos}[c+d x])^2 \left(B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^4 \, dx$$

Optimal (type 3, 80 leaves, 5 steps):

$$b^2 C x + \frac{\left(a^2 B + 2 b^2 B + 4 a b C\right) \text{ArcTanh}[\text{Sin}[c + d x]]}{2 d} + \frac{a (2 b B + a C) \text{Tan}[c + d x]}{d} + \frac{a^2 B \text{Sec}[c + d x] \text{Tan}[c + d x]}{2 d}$$

Result (type 3, 225 leaves) :

$$\frac{1}{4 d} \left(4 b^2 c C + 4 b^2 C d x - 2 \left(a^2 B + 2 b^2 B + 4 a b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 2 a^2 B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 4 b^2 B \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 8 a b C \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \frac{a^2 B}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} - \frac{a^2 B}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + 4 a (2 b B + a C) \text{Tan}[c + d x]\right)$$

## Problem 785: Result more than twice size of optimal antiderivative.

$$\int (a + b \text{Cos}[c + d x])^2 \left(B \text{Cos}[c + d x] + C \text{Cos}[c + d x]^2\right) \text{Sec}[c + d x]^6 \, dx$$

Optimal (type 3, 156 leaves, 8 steps) :

$$\frac{\left(3 a^2 B + 4 b^2 B + 8 a b C\right) \text{ArcTanh}[\text{Sin}[c + d x]]}{8 d} + \frac{\left(4 a b B + 2 a^2 C + 3 b^2 C\right) \text{Tan}[c + d x]}{3 d} + \frac{\left(3 a^2 B + 4 b^2 B + 8 a b C\right) \text{Sec}[c + d x] \text{Tan}[c + d x]}{8 d} + \frac{a (2 b B + a C) \text{Sec}[c + d x]^2 \text{Tan}[c + d x]}{3 d} + \frac{a^2 B \text{Sec}[c + d x]^3 \text{Tan}[c + d x]}{4 d}$$

Result (type 3, 457 leaves) :

$$\frac{1}{48 d} \left(-6 \left(3 a^2 B + 4 b^2 B + 8 a b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 6 \left(3 a^2 B + 4 b^2 B + 8 a b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \frac{3 a^2 B}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} + \frac{12 b^2 B + 8 a b (B + 3 C) + a^2 (9 B + 4 C)}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{8 a (2 b B + a C) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^3} + \frac{16 \left(4 a b B + 2 a^2 C + 3 b^2 C\right) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]} - \frac{3 a^2 B}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^4} + \frac{8 a (2 b B + a C) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^3} - \frac{12 b^2 B + 8 a b (B + 3 C) + a^2 (9 B + 4 C)}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{16 \left(4 a b B + 2 a^2 C + 3 b^2 C\right) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]}\right)$$

## Problem 790: Result more than twice size of optimal antiderivative.

$$\int (a + b \text{Cos}[c + d x])^3 \left(B \text{Cos}[c + d x] + C \text{Cos}[c + d x]^2\right) \text{Sec}[c + d x]^4 \, dx$$

Optimal (type 3, 124 leaves, 6 steps) :

$$b^2 (b B + 3 a C) x + \frac{a (a^2 B + 6 b^2 B + 6 a b C) \text{ArcTanh}[\text{Sin}[c + d x]]}{2 d} - \frac{b^2 (a B - 2 b C) \text{Sin}[c + d x]}{2 d} + \frac{a^2 (2 b B + a C) \text{Tan}[c + d x]}{d} + \frac{a B (a + b \text{Cos}[c + d x])^2 \text{Sec}[c + d x] \text{Tan}[c + d x]}{2 d}$$

Result (type 3, 277 leaves):

$$\frac{1}{4 d} \left(4 b^2 (b B + 3 a C) (c + d x) - 2 a (a^2 B + 6 b^2 B + 6 a b C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 2 a (a^2 B + 6 b^2 B + 6 a b C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \frac{a^3 B}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{4 a^2 (3 b B + a C) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]} - \frac{a^3 B}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{4 a^2 (3 b B + a C) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]} + 4 b^3 C \text{Sin}[c + d x]\right)$$

- **Problem 791: Result more than twice size of optimal antiderivative.**

$$\int (a + b \text{Cos}[c + d x])^3 \left(B \text{Cos}[c + d x] + C \text{Cos}[c + d x]^2\right) \text{Sec}[c + d x]^5 \, dx$$

Optimal (type 3, 145 leaves, 6 steps):

$$b^3 C x + \frac{(3 a^2 b B + 2 b^3 B + a^3 C + 6 a b^2 C) \text{ArcTanh}[\text{Sin}[c + d x]]}{2 d} + \frac{a (2 a^2 B + 8 b^2 B + 9 a b C) \text{Tan}[c + d x]}{3 d} + \frac{a^2 (5 b B + 3 a C) \text{Sec}[c + d x] \text{Tan}[c + d x]}{6 d} + \frac{a B (a + b \text{Cos}[c + d x])^2 \text{Sec}[c + d x]^2 \text{Tan}[c + d x]}{3 d}$$

Result (type 3, 392 leaves):

$$\frac{1}{12 d} \left(12 b^3 C (c + d x) - 6 (3 a^2 b B + 2 b^3 B + a^3 C + 6 a b^2 C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + 6 (3 a^2 b B + 2 b^3 B + a^3 C + 6 a b^2 C) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right] + \frac{a^2 (9 b B + a (B + 3 C))}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{2 a^3 B \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^3} + \frac{4 a (2 a^2 B + 9 b^2 B + 9 a b C) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\text{Cos}\left[\frac{1}{2} (c + d x)\right] - \text{Sin}\left[\frac{1}{2} (c + d x)\right]} + \frac{2 a^3 B \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^3} - \frac{a^2 (9 b B + a (B + 3 C))}{\left(\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]\right)^2} + \frac{4 a (2 a^2 B + 9 b^2 B + 9 a b C) \text{Sin}\left[\frac{1}{2} (c + d x)\right]}{\text{Cos}\left[\frac{1}{2} (c + d x)\right] + \text{Sin}\left[\frac{1}{2} (c + d x)\right]}\right)$$

## Problem 792: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^3\,\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 3, 188 leaves, 8 steps):

$$\frac{\left(3\,a^3\,B+12\,a\,b^2\,B+12\,a^2\,b\,C+8\,b^3\,C\right)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{8\,d}+\frac{\left(6\,a^2\,b\,B+3\,b^3\,B+2\,a^3\,C+9\,a\,b^2\,C\right)\,\mathrm{Tan}[c+d\,x]}{3\,d}+\frac{a\,\left(3\,a^2\,B+10\,b^2\,B+12\,a\,b\,C\right)\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{8\,d}+\frac{a^2\,(3\,b\,B+2\,a\,C)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]}{6\,d}+\frac{a\,B\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{4\,d}$$

Result (type 3, 639 leaves):

$$\frac{\left(-3\,a^3\,B-12\,a\,b^2\,B-12\,a^2\,b\,C-8\,b^3\,C\right)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{\left(3\,a^3\,B+12\,a\,b^2\,B+12\,a^2\,b\,C+8\,b^3\,C\right)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]}{8\,d}+\frac{a^3\,B}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{9\,a^3\,B+12\,a^2\,b\,B+36\,a\,b^2\,B+4\,a^3\,C+36\,a^2\,b\,C}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}-\frac{a^3\,B}{16\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^4}+\frac{-9\,a^3\,B-12\,a^2\,b\,B-36\,a\,b^2\,B-4\,a^3\,C-36\,a^2\,b\,C}{48\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{3\,a^2\,b\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+a^3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{3\,a^2\,b\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+a^3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{6\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{6\,a^2\,b\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,b^3\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,a^3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,a\,b^2\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}+\frac{6\,a^2\,b\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,b^3\,B\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+2\,a^3\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+9\,a\,b^2\,C\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{3\,d\,\left(\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)}$$

## Problem 800: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 143 leaves, 7 steps):

$$-\frac{2\,b^2\,(b\,B-a\,C)\,\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^3\,\sqrt{a-b}\,\sqrt{a+b}\,d}+\frac{\left(a^2\,B+2\,b^2\,B-2\,a\,b\,C\right)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a^3\,d}-\frac{(b\,B-a\,C)\,\mathrm{Tan}[c+d\,x]}{a^2\,d}+\frac{B\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 3, 300 leaves) :

$$\frac{1}{4\,a^3\,d}\left(\frac{8\,b^2\,(b\,B-a\,C)\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{\sqrt{-a^2+b^2}}-2\,\left(a^2\,B+2\,b^2\,B-2\,a\,b\,C\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$

$$2\,\left(a^2\,B+2\,b^2\,B-2\,a\,b\,C\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{a^2\,B}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\left.\frac{4\,a\,(-b\,B+a\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}-\frac{a^2\,B}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,a\,(-b\,B+a\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 818: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 213 leaves, 10 steps) :

$$-\frac{B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{(a\,B+2\,b\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{(b\,B+2\,a\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Tan}[c+d\,x]}{d}$$

Result (type 4, 484 leaves) :

$$\frac{1}{4\,d}\left(\frac{8\,b\,C\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,(b\,B+4\,a\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\left(2\,i\,b\,B\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\;\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+\frac{B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{d}$$

- **Problem 819: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 292 leaves, 11 steps) :

$$-\frac{(b B+4 a C) \sqrt{a+b \cos[c+d x]}\ \text{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{4 a d \sqrt{\frac{a+b \cos[c+d x]}{a+b}}}+$$

$$\frac{(3 b B+4 a C) \sqrt{\frac{a+b \cos[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \cos[c+d x]}}+\frac{\left(4 a^2 B-b^2 B+4 a b C\right) \sqrt{\frac{a+b \cos[c+d x]}{a+b}}\ \text{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{4 a d \sqrt{a+b \cos[c+d x]}}+$$

$$\frac{(b B+4 a C) \sqrt{a+b \cos[c+d x]}\ \tan[c+d x]}{4 a d}+\frac{B \sqrt{a+b \cos[c+d x]}\ \sec[c+d x] \tan[c+d x]}{2 d}$$

Result (type 4, 552 leaves) :

$$\frac{1}{16 a d}\left(\frac{8 a b B \sqrt{\frac{a+b \cos[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \cos[c+d x]}}+\frac{2 \left(8 a^2 B-3 b^2 B+4 a b C\right) \sqrt{\frac{a+b \cos[c+d x]}{a+b}}\ \text{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \cos[c+d x]}}-\right.$$

$$\left(2 i \left(-b^2 B-4 a b C\right) \sqrt{\frac{b-b \cos[c+d x]}{a+b}} \sqrt{-\frac{b+b \cos[c+d x]}{a-b}}\ \cos[2 (c+d x)]\right.$$

$$\left(2 a (a-b)\ \text{EllipticE}\left[i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \cos[c+d x]}\right], \frac{a+b}{a-b}\right]+b \left(2 a\ \text{EllipticF}\left[i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \cos[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\ \text{EllipticPi}\left[\frac{a+b}{a}, i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \cos[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \sin[c+d x]\right) \Big/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\cos[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a (a+b \cos[c+d x])+(a+b \cos[c+d x])^2}{b^2}} \left(2 a^2-b^2-4 a (a+b \cos[c+d x])+2 (a+b \cos[c+d x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b \cos[c+d x]} \left(\frac{\sec[c+d x] (b B \sin[c+d x]+4 a C \sin[c+d x])}{4 a}+\frac{1}{2} B \sec[c+d x] \tan[c+d x]\right)}{d}$$

## Problem 823: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b \cos[c+d x])^{3/2} \left(B \cos[c+d x]+C \cos[c+d x]^2\right) \sec[c+d x]^2\, dx$$

Optimal (type 4, 236 leaves, 10 steps):

$$\frac{2\,(3\,b\,B+4\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{2\,\left(3\,a\,b\,B-a^2\,C+b^2\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^2\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,b\,C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 406 leaves):

$$\frac{1}{6\,d}\left(\frac{4\,\left(6\,a\,b\,B+3\,a^2\,C+b^2\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,\left(6\,a^2\,B+3\,b^2\,B+4\,a\,b\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{1}{a\,b\,\sqrt{-\frac{1}{a+b}}}2\,\mathrm{i}\,(3\,b\,B+4\,a\,C)\,\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\,\sqrt{\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{-a+b}}\;\mathrm{Csc}[c+d\,x]$$

$$\left(-2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(-2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]+b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)+4\,b\,C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]\right)$$

## ■ Problem 824: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 232 leaves, 10 steps):

$$-\frac{(a B-2 b C) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{\left(a^2 B+2 b^2 B+2 a b C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{a(3 b B+2 a C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{a B \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{d}$$

Result (type 4, 398 leaves):

$$\frac{1}{4 d}\left(\frac{8 b(b B+2 a C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\right.$$

$$\frac{2\left(5 a b B+4 a^2 C+2 b^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{a b \sqrt{-\frac{1}{a+b}}} 2 \mathrm{i}(-a B+2 b C) \sqrt{-\frac{b(-1+\operatorname{Cos}[c+d x])}{a+b}}$$

$$\sqrt{\frac{b(1+\operatorname{Cos}[c+d x])}{-a+b}} \operatorname{Csc}[c+d x]\left(-2 a(a-b) \operatorname{EllipticE}\left[\mathrm{i} \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+\right.$$

$$b\left(-2 a \operatorname{EllipticF}\left[\mathrm{i} \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+\right.$$

$$\left.\left.\left.b \operatorname{EllipticPi}\left[\frac{a+b}{a}, \mathrm{i} \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right)+4 a B \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]\right)$$

- **Problem 825: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b \operatorname{Cos}[c+d x])^{3/2}\left(B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^4 \, dx$$

Optimal (type 4, 295 leaves, 11 steps):

$$-\frac{(5 b B+4 a C)\sqrt{a+b\,\mathrm{Cos}[c+d x]}\ \mathrm{EllipticE}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{4 d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(7 a b B+4 a^2 C+8 b^2 C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{a+b}}\ \mathrm{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{4 d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}+\frac{\left(4 a^2 B+3 b^2 B+12 a b C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{a+b}}\ \mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{4 d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}+$$

$$\frac{(5 b B+4 a C)\sqrt{a+b\,\mathrm{Cos}[c+d x]}\ \mathrm{Tan}[c+d x]}{4 d}+\frac{a B\sqrt{a+b\,\mathrm{Cos}[c+d x]}\ \mathrm{Sec}[c+d x]\ \mathrm{Tan}[c+d x]}{2 d}$$

Result (type 4, 556 leaves) :

$$\frac{1}{16 d}\left(\frac{2\left(4 a b B+16 b^2 C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{a+b}}\ \mathrm{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}+\frac{2\left(8 a^2 B+b^2 B+20 a b C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{a+b}}\ \mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}-\right.$$

$$\left(2\,\mathrm{i}\left(-5 b^2 B-4 a b C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d x]}{a+b}}\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d x]}{a-b}}\ \mathrm{Cos}[2(c+d x)]\right.$$

$$\left(2 a (a-b)\ \mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(2 a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d x]\Bigg)\Bigg/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\mathrm{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b\,\mathrm{Cos}[c+d x])+(a+b\,\mathrm{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a(a+b\,\mathrm{Cos}[c+d x])+2(a+b\,\mathrm{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d x]}\left(\frac{1}{4}\mathrm{Sec}[c+d x]\,(5 b B\,\mathrm{Sin}[c+d x]+4 a C\,\mathrm{Sin}[c+d x])+\frac{1}{2}a B\,\mathrm{Sec}[c+d x]\ \mathrm{Tan}[c+d x]\right)$$

- **Problem 826: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d x])^{3/2}\left(B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)\mathrm{Sec}[c+d x]^5\,dx$$

Optimal (type 4, 375 leaves, 12 steps):

$$-\frac{\left(16 a^2 B+3 b^2 B+30 a b C\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 a d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(16 a^2 B+17 b^2 B+42 a b C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(12 a^2 b B-b^3 B+8 a^3 C+6 a b^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{8 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{\left(16 a^2 B+3 b^2 B+30 a b C\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]}{24 a d}+$$

$$\frac{(7 b B+6 a C) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 d}+\frac{a B \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 634 leaves):

$$\frac{1}{96\,a\,d}\left(\frac{2\left(28\,a\,b^2\,B+24\,a^2\,b\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(56\,a^2\,b\,B-9\,b^3\,B+48\,a^3\,C+6\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,i\left(-16\,a^2\,b\,B-3\,b^3\,B-30\,a\,b^2\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\ \sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\ \text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\ \sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\ \left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{1}{12}\,\text{Sec}[c+d\,x]^2\,(7\,b\,B\,\text{Sin}[c+d\,x]+6\,a\,C\,\text{Sin}[c+d\,x])+\right.$$

$$\left.\frac{\text{Sec}[c+d\,x]\left(16\,a^2\,B\,\text{Sin}[c+d\,x]+3\,b^2\,B\,\text{Sin}[c+d\,x]+30\,a\,b\,C\,\text{Sin}[c+d\,x]\right)}{24\,a}+\frac{1}{3}\,a\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 830: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 292 leaves, 11 steps):

$$\frac{2\left(35\,a\,b\,B+23\,a^2\,C+9\,b^2\,C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{2\left(10\,a^2\,b\,B+5\,b^3\,B-8\,a^3\,C+8\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,a^3\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2\,b\,(5\,b\,B+8\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{15\,d}+\frac{2\,b\,C\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}$$

Result (type 4, 453 leaves) :

$$\frac{1}{30\,d}\left(\frac{4\left(45\,a^2\,b\,B+5\,b^3\,B+15\,a^3\,C+17\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(30\,a^3\,B+35\,a\,b^2\,B+23\,a^2\,b\,C+9\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{1}{a\,b\,\sqrt{-\frac{1}{a+b}}}\,2\,\mathrm{i}\,\left(35\,a\,b\,B+23\,a^2\,C+9\,b^2\,C\right)\sqrt{-\frac{b\,(-1+\mathrm{Cos}[c+d\,x])}{a+b}}\;\sqrt{-\frac{b\,(1+\mathrm{Cos}[c+d\,x])}{a-b}}$$

$$\mathrm{Csc}[c+d\,x]\left(-2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(-2\,a\,\mathrm{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.\left.\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)+$$

$$\left.4\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;(5\,b\,B+11\,a\,C+3\,b\,C\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]\right)$$

## Problem 831: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 296 leaves, 11 steps):

$$-\frac{\left(3a^2B-6b^2B-14abC\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{3d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{\left(3a^3B+12ab^2B+4a^2bC+2b^3C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{3d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{a^2(5bB+2aC)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{b(3aB-2bC)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3d}+\frac{aB(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 4, 560 leaves):

$$\frac{1}{12\,d}\left(\frac{2\left(36\,a\,b^2\,B+36\,a^2\,b\,C+4\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(27\,a^2\,b\,B+6\,b^3\,B+12\,a^3\,C+14\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\left(-3\,a^2\,b\,B+6\,b^3\,B+14\,a\,b^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{2}{3}\,b^2\,C\,\mathrm{Sin}[c+d\,x]+a^2\,B\,\mathrm{Tan}[c+d\,x]\right)}{d}$$

- **Problem 832: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 315 leaves, 11 steps):

$$-\frac{\left(9 a b B+4 a^2 C-8 b^2 C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(11 a^2 b B+8 b^3 B+4 a^3 C+16 a b^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{a\left(4 a^2 B+15 b^2 B+20 a b C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{a(7 b B+4 a C) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{4 d}+\frac{a B(a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 4, 589 leaves) :

$$\frac{1}{16\,d}\left(\frac{2\left(4\,a^2\,b\,B+16\,b^3\,B+48\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(8\,a^3\,B+21\,a\,b^2\,B+36\,a^2\,b\,C+8\,b^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,i\,\left(-9\,a\,b^2\,B-4\,a^2\,b\,C+8\,b^3\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{4}\,\text{Sec}[c+d\,x]\,\left(9\,a\,b\,B\,\text{Sin}[c+d\,x]+4\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\frac{1}{2}\,a^2\,B\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)$$

- **Problem 833: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^5\,dx$$

Optimal (type 4, 376 leaves, 12 steps) :

$$-\frac{\left(16 a^2 B+33 b^2 B+54 a b C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(16 a^3 B+59 a b^2 B+66 a^2 b C+48 b^3 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(20 a^2 b B+5 b^3 B+8 a^3 C+30 a b^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{8 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(16 a^2 B+33 b^2 B+54 a b C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{24 d}+$$

$$\frac{a (3 b B+2 a C) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{4 d}+\frac{a B (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 639 leaves) :

$$\frac{1}{96\,d}\left(\frac{2\,\left(52\,a\,b^2\,B+24\,a^2\,b\,C+96\,b^3\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right.+$$

$$\frac{2\,\left(104\,a^2\,b\,B-3\,b^3\,B+48\,a^3\,C+126\,a\,b^2\,C\right)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\,\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-16\,a^2\,b\,B-33\,b^3\,B-54\,a\,b^2\,C\right)\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\,\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\left(\frac{1}{12}\,\mathrm{Sec}[c+d\,x]^2\,\left(13\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+6\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\left.\frac{1}{24}\,\mathrm{Sec}[c+d\,x]\,\left(16\,a^2\,B\,\mathrm{Sin}[c+d\,x]+33\,b^2\,B\,\mathrm{Sin}[c+d\,x]+54\,a\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{1}{3}\,a^2\,B\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 834: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^6\,dx$$

Optimal (type 4, 465 leaves, 13 steps):

$$-\frac{\left(284\,a^2\,b\,B+15\,b^3\,B+128\,a^3\,C+264\,a\,b^2\,C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{192\,a\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(356\,a^2\,b\,B+133\,b^3\,B+128\,a^3\,C+472\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{192\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{\left(48\,a^4\,B+120\,a^2\,b^2\,B-5\,b^4\,B+160\,a^3\,b\,C+40\,a\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{64\,a\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{\left(284\,a^2\,b\,B+15\,b^3\,B+128\,a^3\,C+264\,a\,b^2\,C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Tan}[c+d\,x]}{192\,a\,d}+$$

$$\frac{\left(36\,a^2\,B+59\,b^2\,B+104\,a\,b\,C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]\;\mathrm{Tan}[c+d\,x]}{96\,d}+$$

$$\frac{a\,(11\,b\,B+8\,a\,C)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}[c+d\,x]^2\;\mathrm{Tan}[c+d\,x]}{24\,d}+\frac{a\,B\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\;\mathrm{Sec}[c+d\,x]^3\;\mathrm{Tan}[c+d\,x]}{4\,d}$$

Result (type 4, 729 leaves) :

$$\frac{1}{768\,a\,d}\left(\frac{2\left(144\,a^3\,b\,B+236\,a\,b^3\,B+416\,a^2\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right.$$

$$2\left(288\,a^4\,B+436\,a^2\,b^2\,B-45\,b^4\,B+832\,a^3\,b\,C-24\,a\,b^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\left(-284\,a^2\,b^2\,B-15\,b^4\,B-128\,a^3\,b\,C-264\,a\,b^3\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Bigg/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{1}{24}\text{Sec}[c+d\,x]^3\left(17\,a\,b\,B\,\text{Sin}[c+d\,x]+8\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\frac{1}{96}\text{Sec}[c+d\,x]^2\left(36\,a^2\,B\,\text{Sin}[c+d\,x]+59\,b^2\,B\,\text{Sin}[c+d\,x]+104\,a\,b\,C\,\text{Sin}[c+d\,x]\right)+$$

$$1/(192\,a)\,\text{Sec}[c+d\,x]\left(284\,a^2\,b\,B\,\text{Sin}[c+d\,x]+15\,b^3\,B\,\text{Sin}[c+d\,x]+128\,a^3\,C\,\text{Sin}[c+d\,x]+264\,a\,b^2\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\left.\frac{1}{4}a^2\,B\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 839: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 216 leaves, 10 steps):

$$-\frac{B\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{a\,d\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{d\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{(b\,B-2\,a\,C)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{B\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{a\,d}$$

Result (type 4, 320 leaves) :

$$\frac{1}{4\,a\,d}\left(\frac{2\,(-3\,b\,B+4\,a\,C)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\right.$$

$$1\Big/\left(a\,b\sqrt{-\frac{1}{a+b}}\right)2\,i\,B\sqrt{-\frac{b\,(-1+\text{Cos}[c+d\,x])}{a+b}}\sqrt{\frac{b\,(1+\text{Cos}[c+d\,x])}{-a+b}}\;\text{Csc}[c+d\,x]$$

$$\left(-2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(-2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]+b\,\text{EllipticPi}\left[\frac{a+b}{a},i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)+4\,B\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]\right)$$

- **Problem 840: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^4}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 299 leaves, 11 steps) :

$$\frac{(3\,b\,B-4\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{(b\,B-4\,a\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\left(4\,a^2\,B+3\,b^2\,B-4\,a\,b\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{(3\,b\,B-4\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]}{4\,a^2\,d}+\frac{B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\;\text{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 4, 556 leaves) :

$$\frac{1}{16\,a^2\,d}\left(\frac{8\,a\,b\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,\left(8\,a^2\,B+9\,b^2\,B-12\,a\,b\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,i\,\left(3\,b^2\,B-4\,a\,b\,C\right)\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\text{Sin}[c+d\,x]\right)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{\text{Sec}[c+d\,x]\,(-3\,b\,B\,\text{Sin}[c+d\,x]+4\,a\,C\,\text{Sin}[c+d\,x])}{4\,a^2}+\frac{B\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a}\right)}{d}$$

- **Problem 845: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 190 leaves, 8 steps) :

$$-\frac{2\,(b\,B-a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{2\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,b\,(b\,B-a\,C)\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 614 leaves) :

$$-\frac{2\,\text{Cos}[c+d\,x]\,(C+B\,\text{Sec}[c+d\,x])\,\left(-b^2\,B\,\text{Sin}[c+d\,x]+a\,b\,C\,\text{Sin}[c+d\,x]\right)}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,(B+C\,\text{Cos}[c+d\,x])}-\frac{1}{2\,a\,(-a+b)\,(a+b)\,d\,(B+C\,\text{Cos}[c+d\,x])}\,\text{Cos}[c+d\,x]\,(C+B\,\text{Sec}[c+d\,x])$$

$$\left(\frac{2\,\left(-2\,a\,b\,B+2\,a^2\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,\left(2\,a^2\,B-3\,b^2\,B+a\,b\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\right.$$

$$\left(2\,i\,\left(-b^2\,B+a\,b\,C\right)\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\right.$$

$$\left.\left.\sqrt{1-\text{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)$$

- **Problem 846: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^3}{(a+b \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 4, 303 leaves, 11 steps):

$$-\frac{\left(a^2 B-3 b^2 B+2 a b C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{a^2 \left(a^2-b^2\right) d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{B \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{a d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{(3 b B-2 a C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{b \left(a^2 B-3 b^2 B+2 a b C\right) \operatorname{Sin}[c+d x]}{a^2 \left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{B \operatorname{Tan}[c+d x]}{a d \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

Result (type 4, 608 leaves):

$$\frac{1}{4 a^2 (a-b)(a+b) d}\left(\frac{2\left(4 a b^2 B-4 a^2 b C\right)\sqrt{\frac{a+b \cos[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b \cos[c+d x]}}+\right.$$

$$\frac{2\left(-7 a^2 b B+9 b^3 B+4 a^3 C-6 a b^2 C\right)\sqrt{\frac{a+b \cos[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b \cos[c+d x]}}-$$

$$\left(2 i\left(-a^2 b B+3 b^3 B-2 a b^2 C\right)\sqrt{\frac{b-b \cos[c+d x]}{a+b}}\sqrt{-\frac{b+b \cos[c+d x]}{a-b}}\ \text{Cos}[2(c+d x)]\right.$$

$$\left(2 a (a-b)\ \text{EllipticE}\left[i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b \cos[c+d x]}\right],\frac{a+b}{a-b}\right]+b\left(2 a\ \text{EllipticF}\left[i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b \cos[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\ \text{EllipticPi}\left[\frac{a+b}{a},i\ \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b \cos[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d x]\right)\bigg/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\cos[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a (a+b \cos[c+d x])+(a+b \cos[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a (a+b \cos[c+d x])+2 (a+b \cos[c+d x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b \cos[c+d x]}\left(\frac{2\left(-b^3 B \sin[c+d x]+a b^2 C \sin[c+d x]\right)}{a^2\left(a^2-b^2\right)(a+b \cos[c+d x])}+\frac{B \tan[c+d x]}{a^2}\right)}{d}$$

- **Problem 851: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(B \cos[c+d x]+C \cos[c+d x]^2\right) \sec[c+d x]^2}{(a+b \cos[c+d x])^{5/2}}\, dx$$

Optimal (type 4, 349 leaves, 11 steps):

$$-\frac{2\left(7a^2bB-3b^3B-4a^3C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{3a^2\left(a^2-b^2\right)^2 d\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+\frac{2(bB-aC)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\ \mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{3a\left(a^2-b^2\right)d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{2B\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\ \mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2b}{a+b}\right]}{a^2 d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2b(bB-aC)\,\mathrm{Sin}[c+d\,x]}{3a\left(a^2-b^2\right)d\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}+\frac{2b\left(7a^2bB-3b^3B-4a^3C\right)\mathrm{Sin}[c+d\,x]}{3a^2\left(a^2-b^2\right)^2 d\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 743 leaves) :

$$\frac{1}{6 a^2 (a-b)^2 (a+b)^2 d (B+C \mathrm{Cos}[c+d x])}$$

$$\mathrm{Cos}[c+d x] (C+B \mathrm{Sec}[c+d x]) \left(\frac{2 \left(-12 a^3 b B+4 a b^3 B+6 a^4 C+2 a^2 b^2 C\right) \sqrt{\frac{a+b \mathrm{Cos}[c+d x]}{a+b}} \mathrm{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \mathrm{Cos}[c+d x]}}+\right.$$

$$\frac{2 \left(6 a^4 B-19 a^2 b^2 B+9 b^4 B+4 a^3 b C\right) \sqrt{\frac{a+b \mathrm{Cos}[c+d x]}{a+b}} \mathrm{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \mathrm{Cos}[c+d x]}}-$$

$$\left(2 i \left(-7 a^2 b^2 B+3 b^4 B+4 a^3 b C\right) \sqrt{\frac{b-b \mathrm{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \mathrm{Cos}[c+d x]}{a-b}} \mathrm{Cos}[2 (c+d x)] \left(2 a (a-b)\right.\right.$$

$$\mathrm{EllipticE}\left[i \mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \mathrm{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b \left(2 a \mathrm{EllipticF}\left[i \mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \mathrm{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left. b \mathrm{EllipticPi}\left[\frac{a+b}{a}, i \mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \mathrm{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \mathrm{Sin}[c+d x]\right) \Big/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\mathrm{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a (a+b \mathrm{Cos}[c+d x])+(a+b \mathrm{Cos}[c+d x])^2}{b^2}} \left(2 a^2-b^2-4 a (a+b \mathrm{Cos}[c+d x])+2 (a+b \mathrm{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d (B+C \mathrm{Cos}[c+d x])} \mathrm{Cos}[c+d x] \sqrt{a+b \mathrm{Cos}[c+d x]} (C+B \mathrm{Sec}[c+d x])$$

$$\left(-\frac{2 \left(-b^2 B \mathrm{Sin}[c+d x]+a b C \mathrm{Sin}[c+d x]\right)}{3 a \left(a^2-b^2\right) (a+b \mathrm{Cos}[c+d x])^2}-\right.$$

$$\left.\frac{2 \left(-7 a^2 b^2 B \mathrm{Sin}[c+d x]+3 b^4 B \mathrm{Sin}[c+d x]+4 a^3 b C \mathrm{Sin}[c+d x]\right)}{3 a^2 \left(a^2-b^2\right)^2 (a+b \mathrm{Cos}[c+d x])}\right)$$

- **Problem 852: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(B \mathrm{Cos}[c+d x]+C \mathrm{Cos}[c+d x]^2\right) \mathrm{Sec}[c+d x]^3}{(a+b \mathrm{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 437 leaves, 12 steps) :

$$-\frac{\left(3 a^4 B-26 a^2 b^2 B+15 b^4 B+14 a^3 b C-6 a b^3 C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(3 a^2 B-5 b^2 B+2 a b C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{3 a^2 \left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{(5 b B-2 a C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{a^3 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{b \left(3 a^2 B-5 b^2 B+2 a b C\right) \operatorname{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right) d (a+b \operatorname{Cos}[c+d x])^{3/2}}+\frac{b \left(3 a^4 B-26 a^2 b^2 B+15 b^4 B+14 a^3 b C-6 a b^3 C\right) \operatorname{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{B \operatorname{Tan}[c+d x]}{a d (a+b \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 4, 750 leaves) :

$$\frac{1}{12 a^3 (-a+b)^2 (a+b)^2 d}\left(\frac{2 \left(36 a^3 b^2 B-20 a b^4 B-24 a^4 b C+8 a^2 b^3 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{1}{\sqrt{a+b \operatorname{Cos}[c+d x]}}\right.$$

$$2 \left(-33 a^4 b B+86 a^2 b^3 B-45 b^5 B+12 a^5 C-38 a^3 b^2 C+18 a b^4 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]-$$

$$\left(2 i \left(-3 a^4 b B+26 a^2 b^3 B-15 b^5 B-14 a^3 b^2 C+6 a b^4 C\right) \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2 (c+d x)]\right.$$

$$\left(2 a (a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b \left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\right) \Big/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a (a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}} \left(2 a^2-b^2-4 a (a+b \operatorname{Cos}[c+d x])+2 (a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2 \left(-b^3 B \operatorname{Sin}[c+d x]+a b^2 C \operatorname{Sin}[c+d x]\right)}{3 a^2 \left(a^2-b^2\right) (a+b \operatorname{Cos}[c+d x])^2}+\right.$$

$$\left.\frac{2 \left(-10 a^2 b^3 B \operatorname{Sin}[c+d x]+6 b^5 B \operatorname{Sin}[c+d x]+7 a^3 b^2 C \operatorname{Sin}[c+d x]-3 a b^4 C \operatorname{Sin}[c+d x]\right)}{3 a^3 \left(a^2-b^2\right)^2 (a+b \operatorname{Cos}[c+d x])}+\frac{B \operatorname{Tan}[c+d x]}{a^3}\right)$$

- **Problem 881: Result more than twice size of optimal antiderivative.**

$$\int \frac{B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2}{\operatorname{Cos}[c+d x]^{5/2} (a+b \operatorname{Cos}[c+d x])} \, dx$$

Optimal (type 4, 86 leaves, 6 steps) :

$$-\frac{2 B \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right]}{a d}-\frac{2 (b B-a C) \operatorname{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2} (c+d x), 2\right]}{a (a+b) d}+\frac{2 B \operatorname{Sin}[c+d x]}{a d \sqrt{\operatorname{Cos}[c+d x]}}$$

Result (type 4, 210 leaves) :

$$\frac{1}{2\,a\,d}\left(\frac{2\,(-3\,b\,B+2\,a\,C)\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]}{a+b}-\frac{2\,a\,B\left(2\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]-\frac{2\,a\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]}{a+b}\right)}{b}+\right.$$

$$\frac{4\,B\,\text{Sin}[c+d\,x]}{\sqrt{\text{Cos}[c+d\,x]}}-1\Big/\left(a\,b\,\sqrt{\text{Sin}[c+d\,x]^2}\right)2\,B\,\Big(-2\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],\,-1\right]+$$

$$\left.2\,a\,(a+b)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],\,-1\right]+\left(2\,a^2-b^2\right)\,\text{EllipticPi}\left[-\frac{b}{a},\,-\text{ArcSin}\left[\sqrt{\text{Cos}[c+d\,x]}\right],\,-1\right]\Big)\,\text{Sin}[c+d\,x]\right)$$

- **Problem 897: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 560 leaves, 9 steps):

$$-\frac{1}{24\,a\,b^2\,d}(a-b)\,\sqrt{a+b}\,\left(6\,a\,b\,B-3\,a^2\,C+16\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b^2\,d}\sqrt{a+b}\,(a+2\,b)\,(6\,b\,B-3\,a\,C+8\,b\,C)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{8\,b^3\,d}$$

$$\sqrt{a+b}\,\left(2\,a^2\,b\,B-8\,b^3\,B-a^3\,C-4\,a\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(6\,a\,b\,B-3\,a^2\,C+16\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{(2\,b\,B-a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1224 leaves):

$$-\frac{1}{48\,b\,d}\Bigg(-\Bigg(4\,a\,\left(-18\,a\,b\,B+a^2\,C-16\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-24\,b^2\,B-28\,a\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(-6\,a\,b\,B+3\,a^2\,C-16\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\bigg/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\bigg/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)\right)+$$

$$\frac{\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\left(\frac{(6bB+aC)\,\mathrm{Sin}[c+dx]}{12b}+\frac{1}{6}C\,\mathrm{Sin}[2(c+dx)]\right)}{d}$$

- **Problem 898: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\left(B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)}{\sqrt{\mathrm{Cos}[c+dx]}}\,dx$$

Optimal (type 4, 473 leaves, 8 steps):

$$-\frac{1}{4\,a\,b\,d}$$

$$(a-b)\,\sqrt{a+b}\,\,(4\,b\,B+a\,C)\,\operatorname{Cot}[c+d\,x]\,\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,b\,d}\sqrt{a+b}\,\,(a\,C+2\,b\,(2\,B+C))\,\operatorname{Cot}[c+d\,x]\,\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{4\,b^2\,d}\sqrt{a+b}\,\left(4\,a\,b\,B-a^2\,C+4\,b^2\,C\right)\operatorname{Cot}[c+d\,x]\,\operatorname{EllipticPi}\left[\frac{a+b}{b},\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\operatorname{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\operatorname{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\operatorname{Sec}[c+d\,x])}{a-b}}+\frac{(4\,b\,B+a\,C)\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\operatorname{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\operatorname{Cos}[c+d\,x]}}+\frac{C\,\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\operatorname{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1175 leaves):

$$\frac{C\,\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\,\operatorname{Sin}[c+d\,x]}{2\,d}+\frac{1}{8\,d}$$

$$\left(-\left(4\,a\,(4\,b\,B+3\,a\,C)\,\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d\,x]\operatorname{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\operatorname{Csc}[c+d\,x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\right)-4\,a$$

$$(8\,a\,B+4\,b\,C)\left(\left(\sqrt{\frac{(a+b)\operatorname{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\operatorname{Cos}[c+d\,x]\operatorname{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\operatorname{Csc}[c+d\,x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b\operatorname{Cos}[c+d\,x])\operatorname{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\operatorname{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\operatorname{Cos}[c+d\,x]}\,\sqrt{a+b\operatorname{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(4\,b\,B+a\,C)\left(\frac{\mathrm{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right.+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

## Problem 899: Result more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 385 leaves, 7 steps):

$$-\frac{1}{a\,d}(a-b)\sqrt{a+b}\;C\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{d}$$
$$\sqrt{a+b}\;(2\,B+C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b\,d}$$
$$\sqrt{a+b}\;(2\,b\,B+a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{C\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 3054 leaves):

$$\left((1+\text{Cos}[c+d\,x])^{3/2}\left(\frac{B\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{\text{Cos}[c+d\,x]}}+C\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$
$$\left(2\,(a+b)\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-4\,(b\,B+a\,(-B+C))\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\right.$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-8\,b\,B\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$
$$4\,a\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+b\,C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right] \text{Sin}\left[\frac{3}{2}(c+d x)\right]+2 a C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]-b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)\Bigg)\Bigg/$$

$$\Bigg(4 d \sqrt{a+b \text{Cos}[c+d x]}\ \Bigg(\frac{1}{8 (a+b \text{Cos}[c+d x])^{3/2}} b (1+\text{Cos}[c+d x])^{3/2} \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Sin}[c+d x]$$

$$\Bigg(2 (a+b) C \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\ \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-$$

$$4 (b B+a(-B+C)) \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\ \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-$$

$$8 b B \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\ \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-4 a C \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}$$

$$\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\ \text{Sec}\left[\frac{1}{2}(c+d x)\right] \text{Sin}\left[\frac{3}{2}(c+d x)\right]+$$

$$2 a C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]-b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\ \text{Tan}\left[\frac{1}{2}(c+d x)\right]\Bigg)-\frac{1}{8 \sqrt{a+b \text{Cos}[c+d x]}}$$

$$3 \sqrt{1+\text{Cos}[c+d x]}\ \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Sin}[c+d x] \Bigg(2 (a+b) C \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\ \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-$$

$$4 (b B+a(-B+C)) \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\ \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-$$

$$8 b B \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}\ \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]-4 a C \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}$$

$$\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\ \text{Sec}\left[\frac{1}{2}(c+d x)\right] \text{Sin}\left[\frac{3}{2}(c+d x)\right]+$$

$$2\,a\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg)+\frac{1}{4\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg(2\,(a+b)\,C\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$4\,(b\,B+a\,(-B+C))\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$8\,b\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]-$$

$$4\,a\,C\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]\,\text{Sin}\Big[\frac{3}{2}\,(c+d\,x)\Big]+2\,a\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg)+$$

$$\frac{1}{4\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\Bigg(\frac{3}{2}\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Cos}\Big[\frac{3}{2}\,(c+d\,x)\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$a\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2-\frac{1}{2}\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}\,(a+b)\,C$$

$$\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$2\,(b\,B+a\,(-B+C))\,\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-$$

$$\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}4\,b\,B\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}$$

$$2\,a\,C\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)+$$

$$\frac{b\,C\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]}{2\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}+\frac{a\,C\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}-$$

$$\frac{b\,C\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}+\frac{1}{2}\,b\,C\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-$$

$$\frac{2\,(b\,B+a\,(-B+C))\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+\frac{4\,b\,B\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{2\,a\,C\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+$$

$$\left.\left.\left.\frac{(a+b)\,C\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\right)\right)$$

- **Problem 900: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 351 leaves, 6 steps) :

$$\frac{1}{a\,d}2\,(a-b)\,\sqrt{a+b}\,B\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{a\,d}$$
$$2\,\sqrt{a+b}\,(b\,B-a\,(B-C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{d}2\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 1161 leaves) :

$$-\left(4\,a^2\,C\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$
$$\left.\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\right)\Big/\left((a+b)\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$
$$\frac{1}{d}4\,a\,(-a\,B+b\,C)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$
$$\left.\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\frac{2\,B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{1}{d}2\,b\,B\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)$$

■ **Problem 901: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 284 leaves, 5 steps):

$$\frac{1}{3\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,(b\,B+3\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{3\,a\,d}2\,(a-b)\,\sqrt{a+b}\,(B-3\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1229 leaves):

$$\frac{1}{3\,a\,d}$$
$$\left(-\left(4\,a\,\left(a^2\,B-b^2\,B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$
$$4\,a\,\left(-a\,b\,B-3\,a^2\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+\right.\right.$$

$$d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(-b^2\,B-3\,a\,b\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\right/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\text{Sec}[c+d\,x]\,(b\,B\,\text{Sin}[c+d\,x]+3\,a\,C\,\text{Sin}[c+d\,x])}{3\,a}+\frac{2}{3}\,B\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

■ **Problem 902: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 350 leaves, 6 steps):

$$\frac{1}{15\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,B-2\,b^2\,B+5\,a\,b\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a^2\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,(9\,a\,B+2\,b\,B-5\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,(b\,B+5\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1315 leaves):

$$-\frac{1}{15\,a^2\,d}\left(-\left(4\,a\,\left(2\,a^2\,b\,B-2\,b^3\,B-5\,a^3\,C+5\,a\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(9\,a^3\,B-2\,a\,b^2\,B+5\,a^2\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(9\,a^2\,b\,B-2\,b^3\,B+5\,a\,b^2\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]^2\,(b\,B\,\text{Sin}[c+d\,x]+5\,a\,C\,\text{Sin}[c+d\,x])}{15\,a}+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]\left(9\,a^2\,B\,\text{Sin}[c+d\,x]-2\,b^2\,B\,\text{Sin}[c+d\,x]+5\,a\,b\,C\,\text{Sin}[c+d\,x]\right)}{15\,a^2}+$$

$$\left.\frac{2}{5}\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 903: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 433 leaves, 7 steps) :

$$\frac{1}{105 a^4 d} 2 (a-b) \sqrt{a+b} \left(19 a^2 b B+8 b^3 B+63 a^3 C-14 a b^2 C\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{105 a^3 d} 2 (a-b) \sqrt{a+b} \left(8 b^2 B+a^2 (25 B-63 C)+2 a b (3 B-7 C)\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 B \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{7 d \text{Cos}[c+d x]^{7/2}}+\frac{2 (b B+7 a C) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{35 a d \text{Cos}[c+d x]^{5/2}}+\frac{2 \left(25 a^2 B-4 b^2 B+7 a b C\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{105 a^2 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1408 leaves) :

$$\frac{1}{105 a^3 d}\left(-\left(4 a \left(25 a^4 B-17 a^2 b^2 B-8 b^4 B-14 a^3 b C+14 a b^3 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(-19 a^3 b B-8 a b^3 B-63 a^4 C+14 a^2 b^2 C\right)\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-\right.$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-19\,a^2\,b^2\,B-8\,b^4\,B-63\,a^3\,b\,C+14\,a\,b^3\,C\right)\left(\frac{\mathbb{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right) + \frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{2\,\text{Sec}[c+d\,x]^3\,(b\,B\,\text{Sin}[c+d\,x]+7\,a\,C\,\text{Sin}[c+d\,x])}{35\,a}+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]^2\,\left(25\,a^2\,B\,\text{Sin}[c+d\,x]-4\,b^2\,B\,\text{Sin}[c+d\,x]+7\,a\,b\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^2}+$$

$$\frac{2\,\text{Sec}[c+d\,x]\,\left(19\,a^2\,b\,B\,\text{Sin}[c+d\,x]+8\,b^3\,B\,\text{Sin}[c+d\,x]+63\,a^3\,C\,\text{Sin}[c+d\,x]-14\,a\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^3}+$$

$$\left.\frac{2}{7}\,B\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 904: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\ (a+b\,\text{Cos}[c+d\,x])^{3/2}\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 670 leaves, 10 steps):

$$-\frac{1}{192\,a\,b^2\,d}(a-b)\,\sqrt{a+b}\,\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+156\,a\,b^2\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\ -$$

$$\frac{1}{192\,b^2\,d}\sqrt{a+b}\,\left(9\,a^3\,C-6\,a^2\,b\,(4\,B+C)-8\,b^3\,(16\,B+9\,C)-4\,a\,b^2\,(28\,B+39\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\ +\frac{1}{64\,b^3\,d}$$

$$\sqrt{a+b}\,\left(8\,a^3\,b\,B-96\,a\,b^3\,B-3\,a^4\,C-24\,a^2\,b^2\,C-48\,b^4\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\ +\frac{\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+156\,a\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{192\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(8\,a\,b\,B-3\,a^2\,C+12\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{32\,b\,d}+$$

$$\frac{(8\,b\,B-3\,a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\ (a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,b\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\ (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1284 leaves):

$$-\frac{1}{384\, b\, d}\Bigg(-\Bigg(4\, a\,\left(-136\, a^2\, b\, B-128\, b^3\, B+3\, a^3\, C-228\, a\, b^2\, C\right)\sqrt{\frac{(a+b)\, \mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\, \mathrm{Cos}[c+d\,x]\, \mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-416\,a\,b^2\,B-228\,a^2\,b\,C-144\,b^3\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-156\,a\,b^2\,C\right)\Bigg(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{\left(56 a b B+3 a^2 C+42 b^2 C\right) \operatorname{Sin}[c+d x]}{96 b}+\right.$$

$$\frac{1}{48}(8 b B+9 a C) \operatorname{Sin}[2(c+d x)]+\frac{1}{16} b\, C \left.\operatorname{Sin}[3(c+d x)]\right)$$

- **Problem 905: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 566 leaves, 9 steps):

$$-\frac{1}{24\,a\,b\,d}(a-b)\sqrt{a+b}\,(30\,a\,b\,B+3\,a^2\,C+16\,b^2\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b\,d}\sqrt{a+b}\,(30\,a\,b\,B+12\,b^2\,B+3\,a^2\,C+14\,a\,b\,C+16\,b^2\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^2\,d}\sqrt{a+b}\,(6\,a^2\,b\,B+8\,b^3\,B-a^3\,C+12\,a\,b^2\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{(30\,a\,b\,B+3\,a^2\,C+16\,b^2\,C)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{(6\,b\,B+7\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,d}+\frac{b\,C\,\text{Cos}[c+d\,x]^{3/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1227 leaves):

$$\frac{1}{48\,d}\Bigg(-\Bigg(\Bigg(4\,a\,(42\,a\,b\,B+17\,a^2\,C+16\,b^2\,C)\sqrt{\frac{(a+b)\,\text{Cot}[\frac{1}{2}\,(c+d\,x)]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}[\frac{1}{2}\,(c+d\,x)]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}[\frac{1}{2}\,(c+d\,x)]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}[\frac{1}{2}\,(c+d\,x)]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,(48\,a^2\,B+24\,b^2\,B+52\,a\,b\,C)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(30\,a\,b\,B+3\,a^2\,C+16\,b^2\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{1}{12}(6\,b\,B+7\,a\,C)\,\mathrm{Sin}[c+d\,x]+\frac{1}{6}\,b\,C\,\mathrm{Sin}[2(c+d\,x)]\right)}{d}$$

- **Problem 906: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 472 leaves, 8 steps):

$$-\frac{1}{4\,a\,d}$$

$$(a-b)\sqrt{a+b}\,(4\,b\,B+5\,a\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,d}\sqrt{a+b}\,(8\,a\,B+4\,b\,B+5\,a\,C+2\,b\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b\,d}\sqrt{a+b}\left(12\,a\,b\,B+3\,a^2\,C+4\,b^2\,C\right)\mathrm{Cot}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{(4\,b\,B+5\,a\,C)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{b\,C\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1198 leaves):

$$\frac{b\,C\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+$$

$$\frac{1}{8\,d}\Bigg(-\Bigg(4\,a\left(8\,a^2\,B+4\,b^2\,B+7\,a\,b\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(16\,a\,b\,B+8\,a^2\,C+4\,b^2\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(4b^2B+5abC\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]\sqrt{a+b\,\mathrm{Cos}[c+dx]}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]}{\sqrt{\mathrm{Cos}[c+dx]}}\right],-\frac{2a}{-a-b}\right]\mathrm{Sec}[c+dx]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+dx)\right]^2\mathrm{Sec}[c+dx]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Sec}[c+dx]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\;\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\;\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\;\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)\right)$$

- **Problem 907: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+dx])^{3/2}\left(B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)}{\mathrm{Cos}[c+dx]^{5/2}}\,dx$$

Optimal (type 4, 449 leaves, 8 steps):

$$\frac{1}{a\,d}(a-b)\sqrt{a+b}\,(2\,a\,B-b\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$\sqrt{a+b}\,(2\,a\,(B-C)-b\,(4\,B+C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{d}\sqrt{a+b}\,(2\,b\,B+3\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,B\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}-\frac{(2\,a\,B-b\,C)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1196 leaves):

$$\frac{2\,a\,B\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{1}{2\,d}\Bigg(\Bigg(4\,a\left(-2\,a\,b\,B-2\,a^2\,C-b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a\left(2\,a^2\,B-2\,b^2\,B-4\,a\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-$$

$$2\left(2\,a\,b\,B-b^2\,C\right)\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)$$

- **Problem 908: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d x])^{3/2}\left(B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{7/2}}\,dx$$

Optimal (type 4, 418 leaves, 7 steps):

$$\frac{1}{3 a d}2(a-b)\sqrt{a+b}\,(4 b B+3 a C)\,\text{Cot}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{3 a d}2\sqrt{a+b}\left(3 b^2 B-a b(4 B-6 C)+a^2(B-3 C)\right)\text{Cot}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{d}2 b\sqrt{a+b}\,C\,\text{Cot}[c+d x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+\frac{2 a B\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{3 d\,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1236 leaves):

$$\frac{1}{3 d}\left(-\left(4 a\left(a^2 B-b^2 B+3 a b C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(-4 a b B-3 a^2 C+3 b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-4\,b^2\,B-3\,a\,b\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right) + \frac{1}{d}$$

$$\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2}{3} \operatorname{Sec}[c+d x] (4 b B \operatorname{Sin}[c+d x] + 3 a C \operatorname{Sin}[c+d x]) + \frac{2}{3} a B \operatorname{Sec}[c+d x]\right.$$

$$\left.\operatorname{Tan}[c+d x]\right)$$

- **Problem 909: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b \operatorname{Cos}[c+d x])^{3/2} \left(B \operatorname{Cos}[c+d x] + C \operatorname{Cos}[c+d x]^2\right)}{\operatorname{Cos}[c+d x]^{9/2}} \, dx$$

Optimal (type 4, 353 leaves, 6 steps):

$$\frac{1}{15 a^2 d} 2 (a-b) \sqrt{a+b} \left(9 a^2 B + 3 b^2 B + 20 a b C\right) \operatorname{Cot}[c+d x]$$

$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} - \frac{1}{15 a d}$$

$$2 (a-b) \sqrt{a+b} (9 a B - 3 b B - 5 a C + 15 b C) \operatorname{Cot}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}}$$

$$\sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} + \frac{2 a B \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{5 d \operatorname{Cos}[c+d x]^{5/2}} + \frac{2 (6 b B + 5 a C) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{15 d \operatorname{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1314 leaves):

$$-\frac{1}{15\,a\,d}\Bigg(-\Bigg(4\,a\,\left(-3\,a^2\,b\,B+3\,b^3\,B-5\,a^3\,C+5\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(9\,a^3\,B+3\,a\,b^2\,B+20\,a^2\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(9\,a^2\,b\,B+3\,b^3\,B+20\,a\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\left(\frac{2}{15}\text{Sec}[c+d x]^2\,(6\,b\,B\,\text{Sin}[c+d x]+5\,a\,C\,\text{Sin}[c+d x])+\right.$$

$$\frac{2\,\text{Sec}[c+d x]\left(9a^2B\,\text{Sin}[c+d x]+3b^2B\,\text{Sin}[c+d x]+20\,a\,b\,C\,\text{Sin}[c+d x]\right)}{15\,a}+$$

$$\left.\frac{2}{5}\;a\;B\;\text{Sec}[c+d x]^2\;\text{Tan}[c+d x]\right)$$

- **Problem 910: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 433 leaves, 7 steps):

$$\frac{1}{105\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(82\,a^2\,b\,B-6\,b^3\,B+63\,a^3\,C+21\,a\,b^2\,C\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{105\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(6\,b^2\,B-a^2\,(25\,B-63\,C)+3\,a\,b\,(19\,B-7\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{7\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}+\frac{2\,(8\,b\,B+7\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{35\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}+\frac{2\left(25\,a^2\,B+3\,b^2\,B+42\,a\,b\,C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{105\,a\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1407 leaves):

$$\frac{1}{105\,a^2\,d}\left(-\left(4\,a\,\left(25\,a^4\,B-31\,a^2\,b^2\,B+6\,b^4\,B+21\,a^3\,b\,C-21\,a\,b^3\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-82\,a^3\,b\,B+6\,a\,b^3\,B-63\,a^4\,C-21\,a^2\,b^2\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-82\,a^2\,b^2\,B+6\,b^4\,B-63\,a^3\,b\,C-21\,a\,b^3\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{35}\text{Sec}[c+d\,x]^3\,(8\,b\,B\,\text{Sin}[c+d\,x]+7\,a\,C\,\text{Sin}[c+d\,x])+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]^2\,\left(25\,a^2\,B\,\text{Sin}[c+d\,x]+3\,b^2\,B\,\text{Sin}[c+d\,x]+42\,a\,b\,C\,\text{Sin}[c+d\,x]\right)}{105\,a}+$$

$$\frac{2\,\text{Sec}[c+d\,x]\,\left(82\,a^2\,b\,B\,\text{Sin}[c+d\,x]-6\,b^3\,B\,\text{Sin}[c+d\,x]+63\,a^3\,C\,\text{Sin}[c+d\,x]+21\,a\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^2}+$$

$$\left.\frac{2}{7}\,a\,B\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 911: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 779 leaves, 11 steps):

$$-\frac{1}{1920\,a\,b^2\,d}(a-b)\sqrt{a+b}\,\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+1692\,a^2\,b^2\,C+1024\,b^4\,C\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{1920\,b^2\,d}\sqrt{a+b}\,\left(45\,a^4\,C-30\,a^3\,b\,(5\,B+C)-16\,b^4\,(45\,B+64\,C)-8\,a\,b^3\,(355\,B+193\,C)-4\,a^2\,b^2\,(295\,B+423\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{128\,b^3\,d}\sqrt{a+b}\,\left(10\,a^4\,b\,B-240\,a^2\,b^3\,B-96\,b^5\,B-3\,a^5\,C-40\,a^3\,b^2\,C-240\,a\,b^4\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+1692\,a^2\,b^2\,C+1024\,b^4\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{1920\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(50\,a^2\,b\,B+120\,b^3\,B-15\,a^3\,C+172\,a\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{320\,b\,d}+$$

$$\frac{\left(50\,a\,b\,B-15\,a^2\,C+64\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{240\,b\,d}+$$

$$\frac{(10\,b\,B-3\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{40\,b\,d}+\frac{C\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{7/2}\,\text{Sin}[c+d\,x]}{5\,b\,d}$$

Result (type 4, 1353 leaves) :

$$-\frac{1}{3840\,b\,d}$$

$$\left(\left(-\left(4\,a\,\left(-1330\,a^3\,b\,B-3560\,a\,b^3\,B+15\,a^4\,C-3236\,a^2\,b^2\,C-1024\,b^4\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-6440\,a^2\,b^2\,B-1440\,b^4\,B-2292\,a^3\,b\,C-4624\,a\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-150\,a^3\,b\,B-2840\,a\,b^3\,B+45\,a^4\,C-1692\,a^2\,b^2\,C-1024\,b^4\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{\left(590\,a^2\,b\,B+420\,b^3\,B+15\,a^3\,C+898\,a\,b^2\,C\right)\,\text{Sin}[c+d\,x]}{960\,b}+\right.$$

$$\frac{1}{480}\left(170\,a\,b\,B+93\,a^2\,C+88\,b^2\,C\right)\,\text{Sin}[2\,(c+d\,x)]+$$

$$\left.\frac{1}{160}\,b\,(10\,b\,B+21\,a\,C)\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{40}\,b^2\,C\,\text{Sin}[4\,(c+d\,x)]\right)$$

## Problem 912: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 664 leaves, 10 steps):

$$-\frac{1}{192\,a\,b\,d}(a-b)\sqrt{a+b}\left(264\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+284\,a\,b^2\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{192\,b\,d}\sqrt{a+b}\left(15\,a^3\,C+8\,b^3\,(16\,B+9\,C)+2\,a^2\,b\,(132\,B+59\,C)+4\,a\,b^2\,(52\,B+71\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{64\,b^2\,d}$$

$$\sqrt{a+b}\left(40\,a^3\,b\,B+160\,a\,b^3\,B-5\,a^4\,C+120\,a^2\,b^2\,C+48\,b^4\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(264\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+284\,a\,b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(24\,a\,b\,B+5\,a^2\,C+12\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,d}+$$

$$\frac{(8\,b\,B+11\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{b\,C\,\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 4, 1287 leaves) :

$$\frac{1}{384\,d}\left(-\left(\left(4\,a\left(472\,a^2\,b\,B+128\,b^3\,B+133\,a^3\,C+356\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(384\,a^3\,B+608\,a\,b^2\,B+644\,a^2\,b\,C+144\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(264\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+284\,a\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\right/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{96}\,\left(104\,a\,b\,B+59\,a^2\,C+42\,b^2\,C\right)\,\text{Sin}[c+d\,x]+\frac{1}{48}\,b\,(8\,b\,B+17\,a\,C)\right.$$

$$\left.\text{Sin}[2\,(c+d\,x)]+\frac{1}{16}\,b^2\,C\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 913: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 563 leaves, 9 steps):

$$-\frac{1}{24\,a\,d}(a-b)\,\sqrt{a+b}\,\left(54\,a\,b\,B+33\,a^2\,C+16\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,d}\sqrt{a+b}\,\left(4\,b^2\,(3\,B+4\,C)+a\,b\,(54\,B+26\,C)+a^2\,(48\,B+33\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d}$$

$$\sqrt{a+b}\,\left(30\,a^2\,b\,B+8\,b^3\,B+5\,a^3\,C+20\,a\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(54\,a\,b\,B+33\,a^2\,C+16\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{b\,(2\,b\,B+3\,a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}+\frac{b\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1251 leaves):

$$\frac{1}{48\,d}\Bigg(-\Bigg(4\,a\,\left(48\,a^3\,B+66\,a\,b^2\,B+59\,a^2\,b\,C+16\,b^3\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(144\,a^2\,b\,B+24\,b^3\,B+48\,a^3\,C+76\,a\,b^2\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(54\,a\,b^2\,B+33\,a^2\,b\,C+16\,b^3\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{12}b\,(6\,b\,B+13\,a\,C)\,\text{Sin}[c+d\,x]+\frac{1}{6}b^2\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 914: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 547 leaves, 9 steps) :

$$\frac{1}{4\,a\,d}(a-b)\sqrt{a+b}\,\left(8\,a^2\,B-4\,b^2\,B-9\,a\,b\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d}\sqrt{a+b}\,\left(8\,a^2\,(B-C)-2\,b^2\,(2\,B+C)-3\,a\,b\,(8\,B+3\,C)\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{4\,d}\sqrt{a+b}\,\left(20\,a\,b\,B+15\,a^2\,C+4\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{\left(8\,a^2\,B-4\,b^2\,B-9\,a\,b\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$
$$\frac{b\,(4\,a\,B-b\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{2\,a\,B\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1241 leaves):

$$\frac{1}{8\,d}\left(\left(4\,a\,\left(-16\,a^2\,b\,B-4\,b^3\,B-8\,a^3\,C-11\,a\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a\,\left(8\,a^3\,B-24\,a\,b^2\,B-24\,a^2\,b\,C-4\,b^3\,C\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\left(8\,a^2\,b\,B-4\,b^3\,B-9\,a\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{2}\,b^2\,C\,\text{Sin}[c+d\,x]+2\,a^2\,B\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 915: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 536 leaves, 9 steps):

$$\frac{1}{3\,a\,d}(a-b)\,\sqrt{a+b}\,\left(14\,a\,b\,B+6\,a^2\,C-3\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,d}\sqrt{a+b}\,\left(2\,a\,b\,(7\,B-9\,C)-2\,a^2\,(B-3\,C)-3\,b^2\,(6\,B+C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$b\,\sqrt{a+b}\,(2\,b\,B+5\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\ \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(2\,b\,B+a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{\left(14\,a\,b\,B+6\,a^2\,C-3\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{2\,a\,B\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1269 leaves):

$$\frac{1}{6\,d}\left(-\left(4\,a\,\left(2\,a^{3}\,B+4\,a\,b^{2}\,B+12\,a^{2}\,b\,C+3\,b^{3}\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^{4}\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-14\,a^{2}\,b\,B+6\,b^{3}\,B-6\,a^{3}\,C+18\,a\,b^{2}\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^{4}\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^{4}\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(-14\,a\,b^{2}\,B-6\,a^{2}\,b\,C+3\,b^{3}\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^{2}\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+dx]}\sqrt{a+b\,\mathrm{Cos}[c+dx]}\left(\frac{2}{3}\mathrm{Sec}[c+dx]\left(7abB\,\mathrm{Sin}[c+dx]+3a^2C\,\mathrm{Sin}[c+dx]\right)+\right.$$
$$\left.\frac{2}{3}a^2B\,\mathrm{Sec}[c+dx]\,\mathrm{Tan}[c+dx]\right)$$

- **Problem 916: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+dx])^{5/2}\left(B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2\right)}{\mathrm{Cos}[c+dx]^{9/2}}\,dx$$

Optimal (type 4, 493 leaves, 8 steps):

$$\frac{1}{15\,a\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,B+23\,b^2\,B+35\,a\,b\,C\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{15\,a\,d}2\,\sqrt{a+b}\,\left(15\,b^3\,B-a\,b^2\,(23\,B-45\,C)+a^2\,b\,(17\,B-35\,C)-a^3\,(9\,B-5\,C)\right)$$

$$\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$2\,b^2\,\sqrt{a+b}\,C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(8\,b\,B+5\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,B\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}$$

Result (type 4, 1319 leaves):

$$\frac{1}{15\,d}\left(\left(4\,a\,\left(-8\,a^2\,b\,B+8\,b^3\,B-5\,a^3\,C-10\,a\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+4\,a\,\left(9\,a^3\,B+23\,a\,b^2\,B+35\,a^2\,b\,C-15\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\left(9\,a^2\,b\,B+23\,b^3\,B+35\,a\,b^2\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{15}\,\text{Sec}[c+d\,x]^2\,\left(11\,a\,b\,B\,\text{Sin}[c+d\,x]+5\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\frac{2}{15}\,\text{Sec}[c+d\,x]\left(9\,a^2\,B\,\text{Sin}[c+d\,x]+23\,b^2\,B\,\text{Sin}[c+d\,x]+35\,a\,b\,C\,\text{Sin}[c+d\,x]\right)+\frac{2}{5}\,a^2\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 917: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 434 leaves, 7 steps):

$$\frac{1}{105\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(145\,a^2\,b\,B+15\,b^3\,B+63\,a^3\,C+161\,a\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a\,d}2\,(a-b)\,\sqrt{a+b}\,\left(a^2\,(25\,B-63\,C)+15\,b^2\,(B-7\,C)-8\,a\,b\,(15\,B-7\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,a\,(10\,b\,B+7\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{35\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,\left(25\,a^2\,B+45\,b^2\,B+77\,a\,b\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,a\,B\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{7\,d\,\text{Cos}[c+d\,x]^{7/2}}$$

Result (type 4, 1409 leaves):

$$\frac{1}{105\,a\,d}\Bigg(-\Bigg(4\,a\,\left(25\,a^4\,B-10\,a^2\,b^2\,B-15\,b^4\,B+56\,a^3\,b\,C-56\,a\,b^3\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(-145\,a^3\,b\,B-15\,a\,b^3\,B-63\,a^4\,C-161\,a^2\,b^2\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+2\left(-145\,a^2\,b^2\,B-15\,b^4\,B-63\,a^3\,b\,C-161\,a\,b^3\,C\right)$$

$$\left(\frac{\mathbb{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{2}{35}\mathrm{Sec}[c+d\,x]^3\left(15\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+7\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\frac{2}{105}\mathrm{Sec}[c+d\,x]^2$$

$$\left(25\,a^2\,B\,\mathrm{Sin}[c+d\,x]+45\,b^2\,B\,\mathrm{Sin}[c+d\,x]+77\,a\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$1/(105\,a)\,2\,\mathrm{Sec}[c+d\,x]\left(145\,a^2\,b\,B\,\mathrm{Sin}[c+d\,x]+15\,b^3\,B\,\mathrm{Sin}[c+d\,x]+63\,a^3\,C\,\mathrm{Sin}[c+d\,x]+161\,a\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\left.\frac{2}{7}a^2\,B\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 918: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{13/2}}\,dx$$

Optimal (type 4, 522 leaves, 8 steps) :

$$\frac{1}{315 a^3 d} 2 (a-b) \sqrt{a+b} \left(147 a^4 B+279 a^2 b^2 B-10 b^4 B+435 a^3 b C+45 a b^3 C\right) \operatorname{Cot}[c+d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}-\frac{1}{315 a^2 d} 2 (a-b) \sqrt{a+b} \left(10 b^3 B-6 a^2 b (19 B-60 C)+3 a^3 (49 B-25 C)+15 a b^2 (11 B-3 C)\right) \operatorname{Cot}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{2 a (4 b B+3 a C) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{21 d \operatorname{Cos}[c+d x]^{7/2}}+\frac{2 \left(49 a^2 B+75 b^2 B+135 a b C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{315 d \operatorname{Cos}[c+d x]^{5/2}}+\frac{2 \left(163 a^2 b B+5 b^3 B+75 a^3 C+135 a b^2 C\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{315 a d \operatorname{Cos}[c+d x]^{3/2}}+\frac{2 a B (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sin}[c+d x]}{9 d \operatorname{Cos}[c+d x]^{9/2}}$$

Result (type 4, 1517 leaves) :

$$-\frac{1}{315 a^2 d}\left(\left(-4 a \left(-114 a^4 b B+124 a^2 b^3 B-10 b^5 B-75 a^5 C+30 a^3 b^2 C+45 a b^4 C\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(147 a^5 B+279 a^3 b^2 B-10 a b^4 B+435 a^4 b C+45 a^2 b^3 C\right) \left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(147\,a^4\,b\,B+279\,a^2\,b^3\,B-10\,b^5\,B+435\,a^3\,b^2\,C+45\,a\,b^4\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2}{63}\text{Sec}[c+d\,x]^4\left(19\,a\,b\,B\,\text{Sin}[c+d\,x]+9\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\frac{2}{315}\text{Sec}[c+d\,x]^3\left(49\,a^2\,B\,\text{Sin}[c+d\,x]+75\,b^2\,B\,\text{Sin}[c+d\,x]+135\,a\,b\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\frac{1}{315\,a}2\,\text{Sec}[c+d\,x]^2\left(163\,a^2\,b\,B\,\text{Sin}[c+d\,x]+5\,b^3\,B\,\text{Sin}[c+d\,x]+75\,a^3\,C\,\text{Sin}[c+d\,x]+135\,a\,b^2\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\frac{1}{315\,a^2}2\,\text{Sec}[c+d\,x]\left(147\,a^4\,B\,\text{Sin}[c+d\,x]+279\,a^2\,b^2\,B\,\text{Sin}[c+d\,x]-10\,b^4\,B\,\text{Sin}[c+d\,x]+435\,a^3\,b\,C\,\text{Sin}[c+d\,x]+45\,a\,b^3\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\left.\frac{2}{9}a^2\,B\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 919: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{15/2}}\,dx$$

Optimal (type 4, 622 leaves, 9 steps) :

$$\frac{1}{3465 a^4 d} 2 (a-b) \sqrt{a+b} \left(3705 a^4 b B + 255 a^2 b^3 B + 40 b^5 B + 1617 a^5 C + 3069 a^3 b^2 C - 110 a b^4 C\right)$$
$$\text{Cot}[c+d x] \,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$
$$\frac{1}{3465 a^3 d} 2 (a-b) \sqrt{a+b} \left(40 b^4 B + 3 a^4 (225 B - 539 C) - 6 a^3 b (505 B - 209 C) + 15 a^2 b^2 (19 B - 121 C) + 10 a b^3 (3 B - 11 C)\right)$$
$$\text{Cot}[c+d x] \,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$
$$\frac{2 a (14 b B + 11 a C) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{99 d \,\text{Cos}[c+d x]^{9/2}} + \frac{2 \left(81 a^2 B + 113 b^2 B + 209 a b C\right) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{693 d \,\text{Cos}[c+d x]^{7/2}} +$$
$$\frac{2 \left(1145 a^2 b B + 15 b^3 B + 539 a^3 C + 825 a b^2 C\right) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{3465 a d \,\text{Cos}[c+d x]^{5/2}} +$$
$$\frac{2 \left(675 a^4 B + 1025 a^2 b^2 B - 20 b^4 B + 1793 a^3 b C + 55 a b^3 C\right) \sqrt{a+b \text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{3465 a^2 d \,\text{Cos}[c+d x]^{3/2}} + \frac{2 a B (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{11 d \,\text{Cos}[c+d x]^{11/2}}$$

Result (type 4, 1640 leaves) :

$$\frac{1}{3465 a^3 d} \left(-\left(4 a \left(675 a^6 B - 390 a^4 b^2 B - 245 a^2 b^4 B - 40 b^6 B + 1254 a^5 b C - 1364 a^3 b^3 C + 110 a b^5 C\right)\right.\right.$$
$$\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Bigg/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$
$$4 a \left(-3705 a^5 b B - 255 a^3 b^3 B - 40 a b^5 B - 1617 a^6 C - 3069 a^4 b^2 C + 110 a^2 b^4 C\right)$$
$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-3705\,a^4\,b^2\,B-255\,a^2\,b^4\,B-40\,b^6\,B-1617\,a^5\,b\,C-3069\,a^3\,b^3\,C+110\,a\,b^5\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\left(\frac{2}{99}\text{Sec}[c+d x]^5\left(23\,a\,b\,B\,\text{Sin}[c+d x]+11\,a^2\,C\,\text{Sin}[c+d x]\right)+\right.$$
$$\frac{2}{693}\text{Sec}[c+d x]^4\left(81\,a^2\,B\,\text{Sin}[c+d x]+113\,b^2\,B\,\text{Sin}[c+d x]+209\,a\,b\,C\,\text{Sin}[c+d x]\right)+\frac{1}{3465\,a}$$
$$2\,\text{Sec}[c+d x]^3\left(1145\,a^2\,b\,B\,\text{Sin}[c+d x]+15\,b^3\,B\,\text{Sin}[c+d x]+539\,a^3\,C\,\text{Sin}[c+d x]+825\,a\,b^2\,C\,\text{Sin}[c+d x]\right)+\frac{1}{3465\,a^2}$$
$$2\,\text{Sec}[c+d x]^2\left(675\,a^4\,B\,\text{Sin}[c+d x]+1025\,a^2\,b^2\,B\,\text{Sin}[c+d x]-20\,b^4\,B\,\text{Sin}[c+d x]+1793\,a^3\,b\,C\,\text{Sin}[c+d x]+55\,a\,b^3\,C\,\text{Sin}[c+d x]\right)+$$
$$\frac{1}{3465\,a^3}2\,\text{Sec}[c+d x]\left(3705\,a^4\,b\,B\,\text{Sin}[c+d x]+255\,a^2\,b^3\,B\,\text{Sin}[c+d x]+40\,b^5\,B\,\text{Sin}[c+d x]+\right.$$
$$\left.\left.1617\,a^5\,C\,\text{Sin}[c+d x]+3069\,a^3\,b^2\,C\,\text{Sin}[c+d x]-110\,a\,b^4\,C\,\text{Sin}[c+d x]\right)+\frac{2}{11}a^2\,B\,\text{Sec}[c+d x]^5\,\text{Tan}[c+d x]\right)$$

- **Problem 920: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{3/2}\left(B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{\sqrt{a+b\,\text{Cos}[c+d x]}}\,dx$$

Optimal (type 4, 571 leaves, 9 steps) :

$$\frac{1}{24\,a\,b^3\,d}(a-b)\sqrt{a+b}\left(18\,a\,b\,B-15\,a^2\,C-16\,b^2\,C\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{24\,b^3\,d}\sqrt{a+b}\left(18\,a\,b\,B-12\,b^2\,B-15\,a^2\,C+10\,a\,b\,C-16\,b^2\,C\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{8\,b^4\,d}\sqrt{a+b}\left(6\,a^2\,b\,B+8\,b^3\,B-5\,a^3\,C-4\,a\,b^2\,C\right)\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{\left(18\,a\,b\,B-15\,a^2\,C-16\,b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{(6\,b\,B-5\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,b^2\,d}+\frac{C\,\text{Cos}[c+d\,x]^{3/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1229 leaves) :

$$\frac{1}{48\,b^2\,d}$$
$$\left(-\left(4\,a\left(-6\,a\,b\,B+5\,a^2\,C+16\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$
$$\left.\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(24\,b^2\,B+4\,a\,b\,C\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-18\,a\,b\,B+15\,a^2\,C+16\,b^2\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right) \Big/ \left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right) +$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right) + \frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{(6\,b\,B-5\,a\,C)\,\text{Sin}[c+d\,x]}{12\,b^2}+\frac{C\,\text{Sin}[2\,(c+d\,x)]}{6\,b}\right)}{d}$$

- **Problem 921: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 479 leaves, 8 steps) :

$$-\frac{1}{4\,a\,b^2\,d}(a-b)\,\sqrt{a+b}\,(4\,b\,B-3\,a\,C)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{4\,b^2\,d}$$

$$\sqrt{a+b}\,(3\,a\,C-2\,b\,(2\,B+C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} +$$

$$\frac{1}{4\,b^3\,d}\sqrt{a+b}\,\left(4\,a\,b\,B-3\,a^2\,C-4\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} + \frac{(4\,b\,B-3\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}} + \frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d}$$

Result (type 4, 1175 leaves) :

$$\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d} + \frac{1}{8\,b\,d}$$

$$\left(-\left(4\,a\,(4\,b\,B-a\,C)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$16\,a\,b\,C\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,(4\,b\,B-3\,a\,C)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 922: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 391 leaves, 8 steps):

$$-\frac{1}{a\,b\,d}(a-b)\sqrt{a+b}\;C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\sqrt{a+b}\;C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}}{b\,d}-\frac{1}{b^2\,d}$$

$$\sqrt{a+b}\;(2\,b\,B-a\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 4017 leaves):

$$\left((1+\mathrm{Cos}[c+d\,x])^{3/2}\left(\frac{B\,\sqrt{\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{C\,\mathrm{Cos}[c+d\,x]^{3/2}}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right.$$

$$\left(2\,i\,(a-b)\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+\right.$$

$$4\,i\,(b\,B-a\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-$$

$$8\,i\,b\,B\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+$$

$$4\,i\,a\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+b\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}$$

$$\left.\left.\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+2\,a\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)\Big/$$

$$\left(4\,b\,\sqrt{\frac{a-b}{a+b}}\;d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{1}{8\,\sqrt{\frac{a-b}{a+b}}\;(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,(1+\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sin}[c+d\,x]\right.\right.$$

$$\left(2\,\mathrm{i}\,(a-b)\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+\right.$$

$$4\,\mathrm{i}\,(b\,B-a\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-8\,\mathrm{i}\,b\,B$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+4\,\mathrm{i}\,a\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+b\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$\left.2\,a\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)-$$

$$\frac{1}{8\,b\,\sqrt{\frac{a-b}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,3\,\sqrt{1+\mathrm{Cos}[c+d\,x]}\;\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sin}[c+d\,x]$$

$$\left(2\,\mathrm{i}\,(a-b)\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+\right.$$

$$4\,\mathrm{i}\,(b\,B-a\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticF}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-8\,\mathrm{i}\,b\,B$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\;\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+4\,\mathrm{i}\,a\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\mathrm{i}\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\;\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+b\,\sqrt{\frac{a-b}{a+b}}\;C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\;\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+$$

$$2\,a\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-b\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Bigg)+$$

$$\frac{1}{4\,b\sqrt{\frac{a-b}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}}(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]$$

$$\Bigg(2\,i\,(a-b)\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticE}\Big[i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]+$$

$$4\,i\,(b\,B-a\,C)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticF}\Big[i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]-8\,i\,b\,B$$

$$\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[\frac{a+b}{a-b},i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]+4\,i\,a\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}$$

$$\text{EllipticPi}\Big[\frac{a+b}{a-b},i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]+b\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]\,\text{Sin}\Big[\frac{3}{2}(c+d\,x)\Big]+$$

$$2\,a\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]-b\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Bigg)+$$

$$\frac{1}{4\,b\sqrt{\frac{a-b}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}}(1+\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2\Bigg(\frac{3}{2}\,b\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Cos}\Big[\frac{3}{2}(c+d\,x)\Big]\,\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]+$$

$$a\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2-\frac{1}{2}\,b\sqrt{\frac{a-b}{a+b}}\;C\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{Sec}\Big[\frac{1}{2}(c+d\,x)\Big]^2+\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}$$

$$i\,(a-b)\,C\,\text{EllipticE}\Big[i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\;\text{Tan}\Big[\frac{1}{2}(c+d\,x)\Big]\Big],-\frac{a+b}{a-b}\Big]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}\,2\,i\,(b\,B-a\,C)\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}\,4\,i\,b\,B$$

$$\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)+$$

$$\frac{1}{\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}}\,2\,i\,a\,C\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\left(-\frac{b\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}+\right.$$

$$\left.\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sin}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])^2}\right)+\frac{b\,\sqrt{\frac{a-b}{a+b}}\,C\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]}{2\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}+$$

$$\frac{a\,\sqrt{\frac{a-b}{a+b}}\,C\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}-\frac{b\,\sqrt{\frac{a-b}{a+b}}\,C\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{2\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}+\frac{1}{2}\,b\,\sqrt{\frac{a-b}{a+b}}$$

$$C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-\frac{2\,\sqrt{\frac{a-b}{a+b}}\,(b\,B-a\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{1+\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-$$

$$\frac{(a-b)\,\sqrt{\frac{a-b}{a+b}}\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}{\sqrt{1+\frac{(a-b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{4\,b\,\sqrt{\frac{a-b}{a+b}}\,B\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{1+\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-$$

$$\left.\left.\left.\frac{2\,a\,\sqrt{\frac{a-b}{a+b}}\,C\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{1+\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}\right)\right)\right)$$

- **Problem 924: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 230 leaves, 4 steps):

$$\frac{1}{a^2\,d}2\,(a-b)\,\sqrt{a+b}\,B\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{a\,d}2\,\sqrt{a+b}\,(B-C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 1164 leaves):

$$\frac{2\,B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{1}{a\,d}\left(-\left(4\,a\,(b\,B-a\,C)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4 a^2 B \left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+$$

$$2 b B \left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\text{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right]\text{Sec}[c+d x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\text{Sec}[c+d x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2 a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\bigg/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 925: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 290 leaves, 5 steps):

$$-\frac{1}{3\,a^3\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,(2\,b\,B-3\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{3\,a^2\,d}2\,\sqrt{a+b}\,(2\,b\,B+a\,(B-3\,C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{2\,B\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1238 leaves):

$$\frac{1}{3\,a^2\,d}$$

$$\left(-\left(4 a \left(a^2 B+2 b^2 B-3 a b C\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[\right.\right.$$

$$\left.c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$4 a \left(2 a b B-3 a^2 C\right) \left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+\right.\right.$$

$$\left.d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$2 \left(2 b^2 B-3 a b C\right) \left(\frac{i \operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right) +$$

$$\frac{\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2 \operatorname{Sec}[c+d x] (-2 b B \operatorname{Sin}[c+d x]+3 a C \operatorname{Sin}[c+d x])}{3 a^2} + \frac{2 B \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{3 a}\right)}{d}$$

- **Problem 926: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{B \operatorname{Cos}[c+d x] + C \operatorname{Cos}[c+d x]^2}{\operatorname{Cos}[c+d x]^{9/2} \sqrt{a+b \operatorname{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 363 leaves, 6 steps) :

$$\frac{1}{15\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(9\,a^2\,B+8\,b^2\,B-10\,a\,b\,C\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a^3\,d}2\,\sqrt{a+b}\,\left(8\,b^2\,B+a^2\,(9\,B-5\,C)-2\,a\,b\,(B+5\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,B\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,a\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}-\frac{2\,(4\,b\,B-5\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,a^2\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1319 leaves) :

$$-\frac{1}{15\,a^3\,d}\left(-\left(4\,a\,\left(7\,a^2\,b\,B+8\,b^3\,B-5\,a^3\,C-10\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(9\,a^3\,B+8\,a\,b^2\,B-10\,a^2\,b\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-\right.$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(9\,a^2\,b\,B+8\,b^3\,B-10\,a\,b^2\,C\right)\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]^2\,(-4\,b\,B\,\text{Sin}[c+d\,x]+5\,a\,C\,\text{Sin}[c+d\,x])}{15\,a^2}+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]\,\left(9\,a^2\,B\,\text{Sin}[c+d\,x]+8\,b^2\,B\,\text{Sin}[c+d\,x]-10\,a\,b\,C\,\text{Sin}[c+d\,x]\right)}{15\,a^3}+$$

$$\left.\frac{2\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\,a}\right)$$

- **Problem 927: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 620 leaves, 9 steps):

$$-\frac{1}{4\,a\,b^3\sqrt{a+b}\,d}\left(12\,a^2\,b\,B-4\,b^3\,B-15\,a^3\,C+7\,a\,b^2\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,b^3\sqrt{a+b}\,d}\left(a\,b\,(12\,B-5\,C)-15\,a^2\,C+2\,b^2\,(2\,B+C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^4\,d}\sqrt{a+b}\,\left(12\,a\,b\,B-15\,a^2\,C-4\,b^2\,C\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(b\,B-a\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\left(12\,a^2\,b\,B-4\,b^3\,B-15\,a^3\,C+7\,a\,b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^3\,\left(a^2-b^2\right)\,d\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{\left(4\,a\,b\,B-5\,a^2\,C+b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b^2\,\left(a^2-b^2\right)\,d}$$

Result (type 4, 1297 leaves) :

$$\frac{\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\ \left(\frac{C\,\text{Sin}[c+d x]}{2 b^2}-\frac{2\left(-a^2 b B\,\text{Sin}[c+d x]+a^3 C\,\text{Sin}[c+d x]\right)}{b^2\left(-a^2+b^2\right)\left(a+b\,\text{Cos}[c+d x]\right)}\right)}{d}-$$

$$\frac{1}{8\,(a-b)\,b^2\,(a+b)\,d}\left(-\left(4 a\left(-4 a^2 b B+4 b^3 B+5 a^3 C-5 a b^2 C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(-8 a b^2 B+4 a^2 b C+4 b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+$$

$$2\left(-12 a^2 b B+4 b^3 B+15 a^3 C-7 a b^2 C\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d x]}\;\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right]\mathrm{Sec}[c+d x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]^2\mathrm{Sec}[c+d x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2 a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\mathrm{Csc}[c+d x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}\;\mathrm{Sin}[c+d x]}{b\sqrt{\mathrm{Cos}[c+d x]}}\right)\right)$$

- **Problem 928: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\mathrm{Cos}[c+d x]}\;\left(B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)}{(a+b\,\mathrm{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 500 leaves, 8 steps) :

$$\frac{1}{a\,b^2\sqrt{a+b}\;d}\left(2\,a\,b\,B-3\,a^2\,C+b^2\,C\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^2\sqrt{a+b}\;d}$$

$$(2\,b\,B-3\,a\,C-b\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^3\,d}$$

$$\sqrt{a+b}\;(2\,b\,B-3\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(b\,B-a\,C)\sqrt{\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{\left(2\,a\,b\,B-3\,a^2\,C+b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b^2\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1234 leaves) :

$$\frac{2\sqrt{\text{Cos}[c+d\,x]}\;\left(-a\,b\,B\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]\right)}{b\left(-a^2+b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{1}{2\,(a-b)\,b\,(a+b)\,d}$$

$$\left(-\left(4\,a\left(a^2\,C-b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\left(-2\,b^2\,B+2\,a\,b\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+\right.\right.$$

$$\left.\left.d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-2\,a\,b\,B+3\,a^2\,C-b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[-\frac{a}{b},\,\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],\,-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 929: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 416 leaves, 7 steps):

$$-\frac{2\,(b\,B-a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a\,b\,\sqrt{a+b}\,d}+$$

$$\frac{2\,(b\,B-a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}}{a\,b\,\sqrt{a+b}\,d}-\frac{1}{b^2\,d}$$

$$2\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(b\,B-a\,C)\,\text{Sin}[c+d\,x]}{b\,(a^2-b^2)\,d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1012 leaves):

$$\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,(-b\,B\,\text{Sin}[c+d\,x]+a\,C\,\text{Sin}[c+d\,x])}{(a^2-b^2)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{1}{(-a+b)\,(a+b)\,d}$$

$$\Bigg(-4\,a\,(a\,B-b\,C)\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(b\,B-a\,C)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\text{Csc}[c+d x]\ \text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\right/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)$$

## Problem 930: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{3/2}\,(a+b\,\text{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 284 leaves, 5 steps):

$$\frac{2\,(b B-a C)\,\text{Cot}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}}{a^2\sqrt{a+b}\ d}+$$

$$\frac{2\,(B+C)\,\text{Cot}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}}{a\sqrt{a+b}\ d}-\frac{2\,(b B-a C)\,\text{Sin}[c+d x]}{\left(a^2-b^2\right) d\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 4, 1223 leaves):

$$-\frac{2\sqrt{\text{Cos}[c+d x]}\ \left(-b^2 B\,\text{Sin}[c+d x]+a b C\,\text{Sin}[c+d x]\right)}{a\left(a^2-b^2\right) d\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{1}{a\,(a-b)\,(a+b)\,d}$$

$$\left(-\left(4 a\left(a^2 B-b^2 B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\right.\right.$$

$$\left.\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\right/\left((a+b)\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a$$

$$\left(-a\,b\,B+a^2\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-b^2\,B+a\,b\,C\right)\left(\frac{\mathbb{i}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 931: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{\mathrm{Cos}[c+d\,x]^{5/2}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 305 leaves, 5 steps) :

$$\frac{1}{a^3\,\sqrt{a+b}\,d}2\,\left(a^2\,B-2\,b^2\,B+a\,b\,C\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\;-$$

$$\frac{1}{a^2\,\sqrt{a+b}\,d}2\,(2\,b\,B+a\,(B-C))\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\;+$$

$$\frac{2\,b\,(b\,B-a\,C)\,\mathrm{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 1281 leaves) :

$$\frac{1}{a^2\,(-a+b)\,(a+b)\,d}\left(-\left(4\,a\,\left(2\,a^2\,b\,B-2\,b^3\,B-a^3\,C+a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(a^3\,B-2\,a\,b^2\,B+a^2\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(a^2\,b\,B-2\,b^3\,B+a\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\left(-b^3\,B\,\text{Sin}[c+d\,x]+a\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{a^2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])}+\frac{2\,B\,\text{Tan}[c+d\,x]}{a^2}\right)}{d}$$

- **Problem 932: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 393 leaves, 6 steps):

$$-\frac{1}{3\,a^4\sqrt{a+b}\,d}2\left(5\,a^2\,b\,B-8\,b^3\,B-3\,a^3\,C+6\,a\,b^2\,C\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a^3\sqrt{a+b}\,d}$$

$$2\,(a+2\,b)\,(4\,b\,B+a\,(B-3\,C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,b\,(b\,B-a\,C)\,\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\,\text{Cos}[c+d\,x]^{3/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\left(a^2\,B-4\,b^2\,B+3\,a\,b\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\left(a^2-b^2\right)d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1357 leaves):

$$\frac{1}{3 a^3 (a-b) (a+b) d}\left(-\left(4 a \left(a^4 B+7 a^2 b^2 B-8 b^4 B-6 a^3 b C+6 a b^3 C\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(5 a^3 b B-8 a b^3 B-3 a^4 C+6 a^2 b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$2 \left(5 a^2 b^2 B-8 b^4 B-3 a^3 b C+6 a b^3 C\right) \left(\frac{i \operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{2\,\mathrm{Sec}[c+d\,x]\,(-5\,b\,B\,\mathrm{Sin}[c+d\,x]+3\,a\,C\,\mathrm{Sin}[c+d\,x])}{3\,a^3}-\right.$$

$$\frac{2\left(-b^4\,B\,\mathrm{Sin}[c+d\,x]+a\,b^3\,C\,\mathrm{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])}+$$

$$\left.\frac{2\,B\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{3\,a^2}\right)$$

- **Problem 933: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{3/2}\left(B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 674 leaves, 9 steps):

$$\frac{1}{3\,a\,(a-b)\,b^3\,(a+b)^{3/2}\,d}\left(6\,a^3\,b\,B-14\,a\,b^3\,B-15\,a^4\,C+26\,a^2\,b^2\,C-3\,b^4\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,b^3\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d}\left(a^2\,b\,(6\,B-5\,C)-3\,b^3\,(4\,B-C)-15\,a^3\,C+a\,b^2\,(2\,B+21\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^4\,d}$$

$$\sqrt{a+b}\,(2\,b\,B-5\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(b\,B-a\,C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\,a\,\left(2\,a^2\,b\,B-6\,b^3\,B-5\,a^3\,C+9\,a\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{\left(6\,a^3\,b\,B-14\,a\,b^3\,B-15\,a^4\,C+26\,a^2\,b^2\,C-3\,b^4\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b^3\,\left(a^2-b^2\right)^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1396 leaves):

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(-\frac{2\,\left(-a^2\,b\,B\,\text{Sin}[c+d\,x]+a^3\,C\,\text{Sin}[c+d\,x]\right)}{3\,b^2\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{2\,\left(-3\,a^3\,b\,B\,\text{Sin}[c+d\,x]+7\,a\,b^3\,B\,\text{Sin}[c+d\,x]+6\,a^4\,C\,\text{Sin}[c+d\,x]-10\,a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{3\,b^2\,\left(-a^2+b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)+$$

$$\frac{1}{6\,(a-b)^2\,b^2\,(a+b)^2\,d}\left(\left(-4\,a\,\left(-2\,a^3\,b\,B+2\,a\,b^3\,B+5\,a^4\,C-8\,a^2\,b^2\,C+3\,b^4\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(2\,a^2\,b^2\,B+6\,b^4\,B+4\,a^3\,b\,C-12\,a\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+2\,\left(-6\,a^3\,b\,B+14\,a\,b^3\,B+15\,a^4\,C-26\,a^2\,b^2\,C+3\,b^4\,C\right)$$

$$\left(\frac{\mathbb{i}\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 934: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 545 leaves, 8 steps) :

$$\frac{1}{3\,a\,(a-b)\,b^2\,(a+b)^{3/2}\,d}$$

$$2\left(4\,b^3\,B+3\,a^3\,C-7\,a\,b^2\,C\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{3\,a\,(a-b)\,b^2\,(a+b)^{3/2}\,d}2\left(a\,b^2\,B-3\,b^3\,B-3\,a^3\,C-a^2\,b\,C+6\,a\,b^2\,C\right)\,\mathrm{Cot}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^3\,d}$$

$$2\sqrt{a+b}\,C\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,a\,(b\,B-a\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}-\frac{2\,a\left(4\,b^3\,B+3\,a^3\,C-7\,a\,b^2\,C\right)\,\mathrm{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

Result (type 4, 1342 leaves):

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{2\left(-a\,b\,B\,\mathrm{Sin}[c+d\,x]+a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,b\left(-a^2+b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])^2}+\frac{2\left(4\,b^3\,B\,\mathrm{Sin}[c+d\,x]+3\,a^3\,C\,\mathrm{Sin}[c+d\,x]-7\,a\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,b\left(-a^2+b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])}\right)-$$

$$\frac{1}{3\,(a-b)^2\,b\,(a+b)^2\,d}\left(-\left(4\,a\left(-a^2\,b\,B+b^3\,B+a^3\,C-a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(4\,a\,b^2\,B-a^2\,b\,C-3\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg) \Big/ \left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right) -$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg) \Big/ \left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$2\,\left(4\,b^3\,B+3\,a^3\,C-7\,a\,b^2\,C\right)\Bigg(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}} +$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg) \Big/ \left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right) -$$

$$\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 935: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 391 leaves, 6 steps):

$$-\frac{1}{3\,a^2\,(a-b)\,(a+b)^{3/2}\,d}2\left(3\,a^2\,B+b^2\,B-4\,a\,b\,C\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,(a-b)\,(a+b)^{3/2}\,d}$$

$$2\,(3\,a\,B-b\,B+a\,C-3\,b\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{2\,(b\,B-a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\left(3\,a^2\,B+b^2\,B-4\,a\,b\,C\right)\text{Sin}[c+d\,x]}{3\left(a^2-b^2\right)^2 d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1335 leaves):

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,(-b\,B\,\text{Sin}[c+d\,x]+a\,C\,\text{Sin}[c+d\,x])}{3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\frac{2\left(3\,a^2\,b\,B\,\text{Sin}[c+d\,x]+b^3\,B\,\text{Sin}[c+d\,x]-4\,a\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{3\,a\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}\right)+$$

$$\frac{1}{3\,a\,(a-b)^2\,(a+b)^2\,d}\Bigg(-\Bigg(4\,a\left(-a^2\,b\,B+b^3\,B+a^3\,C-a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(3\,a^3\,B+a\,b^2\,B-4\,a^2\,b\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(3\,a^2\,b\,B+b^3\,B-4\,a\,b^2\,C\right)\,\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 936: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{3/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 429 leaves, 6 steps):

$$\frac{1}{3\,a^3\,(a-b)\,(a+b)^{3/2}\,d}2\left(6\,a^2\,b\,B-2\,b^3\,B-3\,a^3\,C-a\,b^2\,C\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,a^2\,\sqrt{a+b}\,\left(a^2-b^2\right)d}$$

$$2\left(2\,b^2\,B-3\,a^2\,(B+C)+a\,b\,(3\,B+C)\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,b\,(b\,B-a\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}-\frac{2\left(6\,a^2\,b\,B-2\,b^3\,B-3\,a^3\,C-a\,b^2\,C\right)\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)^2d\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1384 leaves):

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(-\frac{2\left(-b^2\,B\,\text{Sin}[c+d\,x]+a\,b\,C\,\text{Sin}[c+d\,x]\right)}{3\,a\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\frac{2\left(-6\,a^2\,b^2\,B\,\text{Sin}[c+d\,x]+2\,b^4\,B\,\text{Sin}[c+d\,x]+3\,a^3\,b\,C\,\text{Sin}[c+d\,x]+a\,b^3\,C\,\text{Sin}[c+d\,x]\right)}{3\,a^2\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}\right)+$$

$$\frac{1}{3\,a^2\,(a-b)^2\,(a+b)^2\,d}\left(-\left(4\,a\left(3\,a^4\,B-5\,a^2\,b^2\,B+2\,b^4\,B-a^3\,b\,C+a\,b^3\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-6\,a^3\,b\,B+2\,a\,b^3\,B+3\,a^4\,C+a^2\,b^2\,C\right)$$

$$\left(\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-6\,a^2\,b^2\,B+2\,b^4\,B+3\,a^3\,b\,C+a\,b^3\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 937: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,d x$$

Optimal (type 4, 456 leaves, 6 steps) :

$$\frac{1}{3 a^4 (a-b) (a+b)^{3/2} d} 2 \left(3 a^4 B - 15 a^2 b^2 B + 8 b^4 B + 6 a^3 b C - 2 a b^3 C\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{3 a^3 \sqrt{a+b} \left(a^2-b^2\right) d} 2 \left(8 b^3 B - 3 a^3 (B-C) + 2 a b^2 (3 B - C) - 3 a^2 b (3 B + C)\right)$$

$$\text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 b (b B - a C) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \sqrt{\text{Cos}[c+d x]} (a+b \text{Cos}[c+d x])^{3/2}} + \frac{2 b \left(8 a^2 b B - 4 b^3 B - 5 a^3 C + a b^2 C\right) \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}}$$

Result (type 4, 1431 leaves) :

$$-\frac{1}{3 a^3 (a-b)^2 (a+b)^2 d}$$

$$\left(-\left(4 a \left(9 a^4 b B - 17 a^2 b^3 B + 8 b^5 B - 3 a^5 C + 5 a^3 b^2 C - 2 a b^4 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) - 4 a \left(3 a^5 B - 15 a^3 b^2 B + 8 a b^4 B + 6 a^4 b C - 2 a^2 b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+2\left(3\,a^4\,b\,B-15\,a^2\,b^3\,B+8\,b^5\,B+6\,a^3\,b^2\,C-2\,a\,b^4\,C\right)$$

$$\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\mathrm{Csc}[c+d x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2 a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d x]}\right)\Bigg)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\mathrm{Sin}[c+d x]}{b\sqrt{\mathrm{Cos}[c+d x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d x]}\left(\frac{2\left(-b^3 B\,\mathrm{Sin}[c+d x]+a b^2 C\,\mathrm{Sin}[c+d x]\right)}{3 a^2\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d x])^2}+\right.$$

$$\frac{2\left(-9 a^2 b^3 B\,\mathrm{Sin}[c+d x]+5 b^5 B\,\mathrm{Sin}[c+d x]+6 a^3 b^2 C\,\mathrm{Sin}[c+d x]-2 a b^4 C\,\mathrm{Sin}[c+d x]\right)}{3 a^3\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d x])}+$$

$$\left.\frac{2 B\,\mathrm{Tan}[c+d x]}{a^3}\right)$$

## Problem 942: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\mathrm{Cos}[c+d x])\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)\mathrm{Sec}[c+d x]^2\,dx$$

Optimal (type 3, 52 leaves, 4 steps):

$$(b B+a C)\,x+\frac{(A b+a B)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d x]]}{d}+\frac{b C\,\mathrm{Sin}[c+d x]}{d}+\frac{a A\,\mathrm{Tan}[c+d x]}{d}$$

Result (type 3, 187 leaves):

$$b B x+a C x-\frac{A b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}-\frac{a B\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{A b\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+$$

$$\frac{a B\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right]}{d}+\frac{b C\,\mathrm{Cos}[d x]\,\mathrm{Sin}[c]}{d}+\frac{b C\,\mathrm{Cos}[c]\,\mathrm{Sin}[d x]}{d}+\frac{a A\,\mathrm{Tan}[c+d x]}{d}$$

## Problem 945: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\mathrm{Cos}[c+d x])\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)\mathrm{Sec}[c+d x]^5\,dx$$

Optimal (type 3, 137 leaves, 7 steps):

$$\frac{(3 a A+4 b B+4 a C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{8 d}+\frac{(2 A b+2 a B+3 b C) \operatorname{Tan}[c+d x]}{3 d}+$$
$$\frac{(3 a A+4 b B+4 a C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{8 d}+\frac{(A b+a B) \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}+\frac{a A \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{4 d}$$

Result (type 3, 545 leaves) :

$$-\frac{3 a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d}-\frac{b B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}-$$
$$\frac{a C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+\frac{3 a A \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{8 d}+\frac{b B \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+$$
$$\frac{a C \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]}{2 d}+\frac{a A}{16 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}+\frac{3 a A}{16 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$
$$\frac{b B}{4 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+\frac{a C}{4 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{a A}{16 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^4}-$$
$$\frac{3 a A}{16 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{b B}{4 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}-\frac{a C}{4 d\left(\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)^2}+$$
$$\frac{2 A b \operatorname{Tan}[c+d x]}{3 d}+\frac{2 a B \operatorname{Tan}[c+d x]}{3 d}+\frac{b C \operatorname{Tan}[c+d x]}{d}+\frac{A b \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}+\frac{a B \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

## Problem 946: Result more than twice size of optimal antiderivative.

$$\int (a+b \operatorname{Cos}[c+d x])\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^6 \, dx$$

Optimal (type 3, 165 leaves, 7 steps) :

$$\frac{(3 A b+3 a B+4 b C) \operatorname{ArcTanh}[\operatorname{Sin}[c+d x]]}{8 d}+\frac{(4 a A+5 b B+5 a C) \operatorname{Tan}[c+d x]}{5 d}+\frac{(3 A b+3 a B+4 b C) \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{8 d}+$$
$$\frac{(A b+a B) \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{4 d}+\frac{a A \operatorname{Sec}[c+d x]^4 \operatorname{Tan}[c+d x]}{5 d}+\frac{(4 a A+5 b B+5 a C) \operatorname{Tan}[c+d x]^3}{15 d}$$

Result (type 3, 660 leaves) :

$$-\frac{3\,A\,b\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}-\frac{3\,a\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}-\frac{b\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{2\,d}+$$
$$\frac{3\,A\,b\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+\frac{3\,a\,B\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{8\,d}+\frac{b\,C\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]}{2\,d}+$$
$$\frac{A\,b}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}+\frac{3\,A\,b}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$
$$\frac{3\,a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{b\,C}{4\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{A\,b}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-$$
$$\frac{a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^4}-\frac{3\,A\,b}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-\frac{3\,a\,B}{16\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}-$$
$$\frac{b\,C}{4\,d\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{8\,a\,A\,\text{Tan}[c+d\,x]}{15\,d}+\frac{2\,b\,B\,\text{Tan}[c+d\,x]}{3\,d}+\frac{2\,a\,C\,\text{Tan}[c+d\,x]}{3\,d}+$$
$$\frac{4\,a\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{15\,d}+\frac{b\,B\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,C\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,A\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

- **Problem 951: Result more than twice size of optimal antiderivative.**

$$\int(a+b\,\text{Cos}[c+d\,x])^2\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 3, 118 leaves, 5 steps):

$$b\,(b\,B+2\,a\,C)\,x+\frac{\left(2\,A\,b^2+4\,a\,b\,B+a^2\,(A+2\,C)\right)\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}-$$
$$\frac{b^2\,(A-2\,C)\,\text{Sin}[c+d\,x]}{2\,d}+\frac{a\,(A\,b+a\,B)\,\text{Tan}[c+d\,x]}{d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}$$

Result (type 3, 277 leaves):

$$\frac{1}{4\,d}\Bigg(4\,b\,(b\,B+2\,a\,C)\,(c+d\,x)-2\left(2\,A\,b^2+4\,a\,b\,B+a^2\,(A+2\,C)\right)\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+$$
$$2\left(2\,A\,b^2+4\,a\,b\,B+a^2\,(A+2\,C)\right)\text{Log}\left[\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+$$
$$\frac{4\,a\,(2\,A\,b+a\,B)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}-\frac{a^2\,A}{\left(\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)^2}+\frac{4\,a\,(2\,A\,b+a\,B)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}+4\,b^2\,C\,\text{Sin}[c+d\,x]\Bigg)$$

- **Problem 952: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^2 \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right) \text{Sec}[c+d\,x]^4\, dx$$

Optimal (type 3, 141 leaves, 5 steps):

$$b^2\,C\,x+\frac{\left(a^2\,B+2\,b^2\,B+2\,a\,b\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}+\frac{\left(2\,A\,b^2+6\,a\,b\,B+a^2\,(2\,A+3\,C)\right)\,\text{Tan}[c+d\,x]}{3\,d}+\frac{a\,(2\,A\,b+3\,a\,B)\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{6\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 386 leaves):

$$\frac{1}{12\,d}\left(12\,b^2\,C\,(c+d\,x)-6\,\left(a^2\,B+2\,b^2\,B+2\,a\,b\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$
$$6\,\left(a^2\,B+2\,b^2\,B+2\,a\,b\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{a\,(6\,A\,b+a\,(A+3\,B))}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$
$$\frac{2\,a^2\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{4\,\left(3\,A\,b^2+6\,a\,b\,B+a^2\,(2\,A+3\,C)\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+$$
$$\left.\frac{2\,a^2\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{a\,(6\,A\,b+a\,(A+3\,B))}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,\left(3\,A\,b^2+6\,a\,b\,B+a^2\,(2\,A+3\,C)\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 960: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^3 \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right) \text{Sec}[c+d\,x]^4\, dx$$

Optimal (type 3, 196 leaves, 6 steps):

$$b^2\,(b\,B+3\,a\,C)\,x+\frac{\left(2\,A\,b^3+a^3\,B+6\,a\,b^2\,B+3\,a^2\,b\,(A+2\,C)\right)\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{2\,d}-\frac{b^2\,(5\,A\,b+3\,a\,B-6\,b\,C)\,\text{Sin}[c+d\,x]}{6\,d}+\frac{a\,\left(3\,A\,b^2+6\,a\,b\,B+a^2\,(2\,A+3\,C)\right)\,\text{Tan}[c+d\,x]}{3\,d}+\frac{(A\,b+a\,B)\,(a+b\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 3, 549 leaves):

$$\frac{b^2 (b B+3 a C) (c+d x)}{d}+\frac{\left(-3 a^2 A b-2 A b^3-a^3 B-6 a b^2 B-6 a^2 b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+$$

$$\frac{\left(3 a^2 A b+2 A b^3+a^3 B+6 a b^2 B+6 a^2 b C\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]}{2 d}+\frac{a^3 A+9 a^2 A b+3 a^3 B}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{6 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^3}+\frac{-a^3 A-9 a^2 A b-3 a^3 B}{12 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\frac{2 a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a A b^2 \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a^2 b B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^3 C \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+$$

$$\frac{2 a^3 A \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a A b^2 \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+9 a^2 b B \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]+3 a^3 C \,\text{Sin}\left[\frac{1}{2} (c+d x)\right]}{3 d \left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)}+\frac{b^3 C \,\text{Sin}[c+d x]}{d}$$

- **Problem 981: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B \,\text{Cos}[c+d x]+C \,\text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{a+b \,\text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 94 leaves, 4 steps):

$$\frac{C x}{b}-\frac{2 \left(A b^2-a (b B-a C)\right) \text{ArcTan}\left[\frac{\sqrt{a-b} \,\text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{a \sqrt{a-b} \, b \sqrt{a+b} \, d}+\frac{A \,\text{ArcTanh}[\text{Sin}[c+d x]]}{a d}$$

Result (type 3, 256 leaves):

$$\left(2 \left(A+B \,\text{Cos}[c+d x]+C \,\text{Cos}[c+d x]^2\right)\right.$$

$$\left(\left(a C d x-A b \,\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+A b \,\text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]\right) \sqrt{-\left(a^2-b^2\right) (\text{Cos}[c]-i \,\text{Sin}[c])^2}+\right.$$

$$\left.\left.2 \left(A b^2+a (-b B+a C)\right) \text{ArcTan}\left[\frac{(i \,\text{Cos}[c]+\text{Sin}[c]) \left(b \,\text{Sin}[c]+(-a+b \,\text{Cos}[c]) \,\text{Tan}\left[\frac{d x}{2}\right]\right)}{\sqrt{-\left(a^2-b^2\right) (\text{Cos}[c]-i \,\text{Sin}[c])^2}}\right] (i \,\text{Cos}[c]+\text{Sin}[c])\right)\right) \Big/$$

$$\left(a b d (2 A+C+2 B \,\text{Cos}[c+d x]+C \,\text{Cos}[2 (c+d x)]) \sqrt{\left(-a^2+b^2\right) (\text{Cos}[2 c]-i \,\text{Sin}[2 c])}\right)$$

## Problem 982: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^2}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 107 leaves, 5 steps):

$$\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^2\sqrt{a-b}\,\sqrt{a+b}\,d}-\frac{(A\,b-a\,B)\,\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{a^2\,d}+\frac{A\,\mathrm{Tan}[c+d\,x]}{a\,d}$$

Result (type 3, 339 leaves):

$$\frac{1}{a^2\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,(c+d\,x)])}\,2\,\mathrm{Cos}[c+d\,x]^2\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)$$
$$\left((A\,b-a\,B)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]+(-A\,b+a\,B)\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right]-\right.$$
$$\frac{2\,i\left(A\,b^2+a\,(-b\,B+a\,C)\right)\mathrm{ArcTan}\left[\frac{(i\,\mathrm{Cos}[c]+\mathrm{Sin}[c])\left(b\,\mathrm{Sin}[c]+(-a+b\,\mathrm{Cos}[c])\,\mathrm{Tan}\left[\frac{d\,x}{2}\right]\right)}{\sqrt{-(a^2-b^2)\,(\mathrm{Cos}[c]-i\,\mathrm{Sin}[c])^2}}\right](\mathrm{Cos}[c]-i\,\mathrm{Sin}[c])}{\sqrt{(-a^2+b^2)\,(\mathrm{Cos}[c]-i\,\mathrm{Sin}[c])^2}}+$$
$$\left.\frac{a\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{\left(\mathrm{Cos}\left[\frac{c}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]-\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}+\frac{a\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{\left(\mathrm{Cos}\left[\frac{c}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}\right]\right)\left(\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]+\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)}\right)$$

## Problem 983: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 3, 154 leaves, 6 steps):

$$-\frac{2\,b\left(A\,b^2-a\,(b\,B-a\,C)\right)\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^3\sqrt{a-b}\,\sqrt{a+b}\,d}+$$
$$\frac{\left(2\,A\,b^2-2\,a\,b\,B+a^2\,(A+2\,C)\right)\mathrm{ArcTanh}[\mathrm{Sin}[c+d\,x]]}{2\,a^3\,d}-\frac{(A\,b-a\,B)\,\mathrm{Tan}[c+d\,x]}{a^2\,d}+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a\,d}$$

Result (type 3, 314 leaves):

$$\frac{1}{4 a^3 d}\left(\frac{8 b \left(A b^2+a (-b B+a C)\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{-a^2+b^2}}\right]}{\sqrt{-a^2+b^2}}-2 \left(2 A b^2-2 a b B+a^2 (A+2 C)\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\right.$$

$$2 \left(2 A b^2-2 a b B+a^2 (A+2 C)\right) \text{Log}\left[\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right]+\frac{a^2 A}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+$$

$$\left.\frac{4 a (-A b+a B) \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\text{Cos}\left[\frac{1}{2} (c+d x)\right]-\text{Sin}\left[\frac{1}{2} (c+d x)\right]}-\frac{a^2 A}{\left(\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]\right)^2}+\frac{4 a (-A b+a B) \text{Sin}\left[\frac{1}{2} (c+d x)\right]}{\text{Cos}\left[\frac{1}{2} (c+d x)\right]+\text{Sin}\left[\frac{1}{2} (c+d x)\right]}\right)$$

- **Problem 984: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^4}{a+b \text{Cos}[c+d x]} \, dx$$

Optimal (type 3, 214 leaves, 7 steps):

$$\frac{2 b^2 \left(A b^2-a (b B-a C)\right) \text{ArcTan}\left[\frac{\sqrt{a-b} \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{a^4 \sqrt{a-b} \sqrt{a+b} d}-\frac{\left(2 A b^3-a^3 B-2 a b^2 B+a^2 b (A+2 C)\right) \text{ArcTanh}[\text{Sin}[c+d x]]}{2 a^4 d}+$$

$$\frac{\left(3 A b^2-3 a b B+a^2 (2 A+3 C)\right) \text{Tan}[c+d x]}{3 a^3 d}-\frac{(A b-a B) \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 a^2 d}+\frac{A \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 a d}$$

Result (type 3, 466 leaves):

$$\frac{1}{12\,a^4\,d}\left(-\frac{24\,b^2\,\left(A\,b^2+a\,(-b\,B+a\,C)\right)\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{\sqrt{-a^2+b^2}}+6\,\left(2\,A\,b^3-a^3\,B-2\,a\,b^2\,B+a^2\,b\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\right.$$

$$6\,\left(-2\,A\,b^3+a^3\,B+2\,a\,b^2\,B-a^2\,b\,(A+2\,C)\right)\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\frac{a^2\,(-3\,A\,b+a\,(A+3\,B))}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+$$

$$\frac{2\,a^3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}+\frac{4\,a\,\left(3\,A\,b^2-3\,a\,b\,B+a^2\,(2\,A+3\,C)\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}+$$

$$\left.\frac{2\,a^3\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^3}-\frac{a^2\,(-3\,A\,b+a\,(A+3\,B))}{\left(\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)^2}+\frac{4\,a\,\left(3\,A\,b^2-3\,a\,b\,B+a^2\,(2\,A+3\,C)\right)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}\right)$$

- **Problem 990: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 3, 147 leaves, 5 steps) :

$$-\frac{2\,\left(2\,a^2\,A\,b-A\,b^3-a^3\,B+a^2\,b\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^2\,(a-b)^{3/2}\,(a+b)^{3/2}\,d}+\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^2\,d}+\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 319 leaves) :

$$\left(2\,\text{Cos}[c+d\,x]\,(B+C\,\text{Cos}[c+d\,x]+A\,\text{Sec}[c+d\,x])\right.$$

$$\left(-A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+A\,\text{Log}\left[\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right]+\left(2\,i\,\left(A\,b^3+a^3\,B-a^2\,b\,(2\,A+C)\right)\right.\right.$$

$$\left.\text{ArcTan}\left[\frac{(i\,\text{Cos}[c]+\text{Sin}[c])\,\left(b\,\text{Sin}[c]+(-a+b\,\text{Cos}[c])\,\text{Tan}\left[\frac{d\,x}{2}\right]\right)}{\sqrt{-\left(a^2-b^2\right)\,(\text{Cos}[c]-i\,\text{Sin}[c])^2}}\right]\,(\text{Cos}[c]-i\,\text{Sin}[c])^3\right)\Big/\left(\left(-a^2+b^2\right)\,(\text{Cos}[c]-i\,\text{Sin}[c])^2\right)^{3/2}+$$

$$\left.\left.\frac{a\,\left(A\,b^2+a\,(-b\,B+a\,C)\right)\,(-a\,\text{Sin}[c]+b\,\text{Sin}[d\,x])}{(a-b)\,b\,(a+b)\,(a+b\,\text{Cos}[c+d\,x])\,\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\,\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)}\right)\right)\Big/\left(a^2\,d\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,(c+d\,x)])\right)$$

- **Problem 994: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^3\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 3, 456 leaves, 7 steps):

$$\frac{\left(2\,A\,b^2-6\,a\,b\,B+12\,a^2\,C+b^2\,C\right)\,x}{2\,b^5}-\frac{1}{(a-b)^{5/2}\,b^5\,(a+b)^{5/2}\,d}$$

$$a\,\left(6\,A\,b^6-6\,a^5\,b\,B+15\,a^3\,b^3\,B-12\,a\,b^5\,B+a^4\,b^2\,(2\,A-29\,C)-5\,a^2\,b^4\,(A-4\,C)+12\,a^6\,C\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]+$$

$$\frac{\left(6\,a^4\,b\,B-11\,a^2\,b^3\,B+2\,b^5\,B-a^3\,b^2\,(2\,A-21\,C)+a\,b^4\,(5\,A-6\,C)-12\,a^5\,C\right)\,\text{Sin}[c+d\,x]}{2\,b^4\,\left(a^2-b^2\right)^2\,d}-$$

$$\frac{\left(3\,a^3\,b\,B-6\,a\,b^3\,B-a^2\,b^2\,(A-10\,C)+b^4\,(4\,A-C)-6\,a^4\,C\right)\,\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{2\,b^3\,\left(a^2-b^2\right)^2\,d}-$$

$$\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{Cos}[c+d\,x]^3\,\text{Sin}[c+d\,x]}{2\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^2}+\frac{\left(3\,A\,b^4+a\,\left(2\,a^2\,b\,B-5\,b^3\,B-4\,a^3\,C+7\,a\,b^2\,C\right)\right)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{2\,b^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 1150 leaves):

$$\frac{1}{b^5 \left(a^2-b^2\right)^2 \sqrt{-a^2+b^2}\ d}$$

$$a \left(2 a^4 A b^2-5 a^2 A b^4+6 A b^6-6 a^5 b B+15 a^3 b^3 B-12 a b^5 B+12 a^6 C-29 a^4 b^2 C+20 a^2 b^4 C\right) \text{ArcTanh}\left[\frac{(a-b) \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{-a^2+b^2}}\right]+$$

$$\frac{1}{16 b^5 \left(-a^2+b^2\right)^2 d\ (a+b \text{Cos}[c+d x])^2}$$

$$\left(16 a^6 A b^2 (c+d x)-24 a^4 A b^4 (c+d x)+8 A b^8 (c+d x)-48 a^7 b B (c+d x)+72 a^5 b^3 B (c+d x)-24 a b^7 B (c+d x)+\right.$$
$$96 a^8 C (c+d x)-136 a^6 b^2 C (c+d x)-12 a^4 b^4 C (c+d x)+48 a^2 b^6 C (c+d x)+4 b^8 C (c+d x)+32 a^5 A b^3 (c+d x) \text{Cos}[c+d x]-$$
$$64 a^3 A b^5 (c+d x) \text{Cos}[c+d x]+32 a A b^7 (c+d x) \text{Cos}[c+d x]-96 a^6 b^2 B (c+d x) \text{Cos}[c+d x]+192 a^4 b^4 B (c+d x) \text{Cos}[c+d x]-$$
$$96 a^2 b^6 B (c+d x) \text{Cos}[c+d x]+192 a^7 b C (c+d x) \text{Cos}[c+d x]-368 a^5 b^3 C (c+d x) \text{Cos}[c+d x]+160 a^3 b^5 C (c+d x) \text{Cos}[c+d x]+$$
$$16 a b^7 C (c+d x) \text{Cos}[c+d x]+8 a^4 A b^4 (c+d x) \text{Cos}[2 (c+d x)]-16 a^2 A b^6 (c+d x) \text{Cos}[2 (c+d x)]+8 A b^8 (c+d x) \text{Cos}[2 (c+d x)]-$$
$$24 a^5 b^3 B (c+d x) \text{Cos}[2 (c+d x)]+48 a^3 b^5 B (c+d x) \text{Cos}[2 (c+d x)]-24 a b^7 B (c+d x) \text{Cos}[2 (c+d x)]+$$
$$48 a^6 b^2 C (c+d x) \text{Cos}[2 (c+d x)]-92 a^4 b^4 C (c+d x) \text{Cos}[2 (c+d x)]+40 a^2 b^6 C (c+d x) \text{Cos}[2 (c+d x)]+$$
$$4 b^8 C (c+d x) \text{Cos}[2 (c+d x)]-16 a^5 A b^3 \text{Sin}[c+d x]+40 a^3 A b^5 \text{Sin}[c+d x]+48 a^6 b^2 B \text{Sin}[c+d x]-84 a^4 b^4 B \text{Sin}[c+d x]+$$
$$8 a^2 b^6 B \text{Sin}[c+d x]+4 b^8 B \text{Sin}[c+d x]-96 a^7 b C \text{Sin}[c+d x]+160 a^5 b^3 C \text{Sin}[c+d x]-32 a^3 b^5 C \text{Sin}[c+d x]-$$
$$8 a b^7 C \text{Sin}[c+d x]-12 a^4 A b^4 \text{Sin}[2 (c+d x)]+24 a^2 A b^6 \text{Sin}[2 (c+d x)]+36 a^5 b^3 B \text{Sin}[2 (c+d x)]-64 a^3 b^5 B \text{Sin}[2 (c+d x)]+$$
$$16 a b^7 B \text{Sin}[2 (c+d x)]-72 a^6 b^2 C \text{Sin}[2 (c+d x)]+130 a^4 b^4 C \text{Sin}[2 (c+d x)]-48 a^2 b^6 C \text{Sin}[2 (c+d x)]+$$
$$2 b^8 C \text{Sin}[2 (c+d x)]+4 a^4 b^4 B \text{Sin}[3 (c+d x)]-8 a^2 b^6 B \text{Sin}[3 (c+d x)]+4 b^8 B \text{Sin}[3 (c+d x)]-8 a^5 b^3 C \text{Sin}[3 (c+d x)]+$$
$$\left.16 a^3 b^5 C \text{Sin}[3 (c+d x)]-8 a b^7 C \text{Sin}[3 (c+d x)]+a^4 b^4 C \text{Sin}[4 (c+d x)]-2 a^2 b^6 C \text{Sin}[4 (c+d x)]+b^8 C \text{Sin}[4 (c+d x)]\right)$$

- **Problem 998: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]}{(a+b \text{Cos}[c+d x])^3} \, dx$$

Optimal (type 3, 238 leaves, 6 steps):

$$\frac{\left(5 a^2 A b^3-2 A b^5+2 a^5 B+a^3 b^2 B-3 a^4 b (2 A+C)\right) \text{ArcTan}\left[\frac{\sqrt{a-b} \text{Tan}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{a+b}}\right]}{a^3 (a-b)^{5/2} (a+b)^{5/2} d}+$$

$$\frac{A \text{ArcTanh}[\text{Sin}[c+d x]]}{a^3 d}+\frac{\left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{2 a \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x])^2}-\frac{\left(2 A b^4+3 a^3 b B-a^4 C-a^2 b^2 (5 A+2 C)\right) \text{Sin}[c+d x]}{2 a^2 \left(a^2-b^2\right)^2 d (a+b \text{Cos}[c+d x])}$$

Result (type 3, 1065 leaves):

$$-\frac{2\,A\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{a^3\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$
$$\frac{2\,A\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{a^3\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$
$$\frac{1}{\left(a^2-b^2\right)^2\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}\left(-6\,a^4\,A\,b+5\,a^2\,A\,b^3-2\,A\,b^5+2\,a^5\,B+a^3\,b^2\,B-3\,a^4\,b\,C\right)\,\mathrm{Cos}[c+d\,x]$$
$$(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\left(-\left(2\,\mathrm{i}\,\mathrm{ArcTan}\left[\mathrm{Sec}\left[\frac{d\,x}{2}\right]\left(\frac{\mathrm{Cos}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+\mathrm{i}\,a^2\,\mathrm{Sin}[2\,c]-\mathrm{i}\,b^2\,\mathrm{Sin}[2\,c]}}-\right.\right.\right.\right.$$
$$\left.\left.\left.\frac{\mathrm{i}\,\mathrm{Sin}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+\mathrm{i}\,a^2\,\mathrm{Sin}[2\,c]-\mathrm{i}\,b^2\,\mathrm{Sin}[2\,c]}}\right)\left(-\mathrm{i}\,a\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+\mathrm{i}\,b\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]\right)\right]\,\mathrm{Cos}[c]\right)\Big/$$
$$\left(a^3\,d\,\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+\mathrm{i}\,a^2\,\mathrm{Sin}[2\,c]-\mathrm{i}\,b^2\,\mathrm{Sin}[2\,c]}\right)-\left(2\,\mathrm{ArcTan}\left[\mathrm{Sec}\left[\frac{d\,x}{2}\right]\right.\right.$$
$$\left(\frac{\mathrm{Cos}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+\mathrm{i}\,a^2\,\mathrm{Sin}[2\,c]-\mathrm{i}\,b^2\,\mathrm{Sin}[2\,c]}}-\frac{\mathrm{i}\,\mathrm{Sin}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+\mathrm{i}\,a^2\,\mathrm{Sin}[2\,c]-\mathrm{i}\,b^2\,\mathrm{Sin}[2\,c]}}\right)$$
$$\left.\left.\left(-\mathrm{i}\,a\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+\mathrm{i}\,b\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]\right)\right]\,\mathrm{Sin}[c]\right)\Big/\left(a^3\,d\,\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+\mathrm{i}\,a^2\,\mathrm{Sin}[2\,c]-\mathrm{i}\,b^2\,\mathrm{Sin}[2\,c]}\right)\Bigg)+$$
$$\Big(\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}[c]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\,\big(-10\,a^4\,A\,b^2\,\mathrm{Sin}[c]-a^2\,A\,b^4\,\mathrm{Sin}[c]+2\,A\,b^6\,\mathrm{Sin}[c]+6\,a^5\,b\,B\,\mathrm{Sin}[c]+$$
$$3\,a^3\,b^3\,B\,\mathrm{Sin}[c]-2\,a^6\,C\,\mathrm{Sin}[c]-5\,a^4\,b^2\,C\,\mathrm{Sin}[c]-2\,a^2\,b^4\,C\,\mathrm{Sin}[c]+16\,a^3\,A\,b^3\,\mathrm{Sin}[d\,x]-7\,a\,A\,b^5\,\mathrm{Sin}[d\,x]-$$
$$10\,a^4\,b^2\,B\,\mathrm{Sin}[d\,x]+a^2\,b^4\,B\,\mathrm{Sin}[d\,x]+4\,a^5\,b\,C\,\mathrm{Sin}[d\,x]+5\,a^3\,b^3\,C\,\mathrm{Sin}[d\,x]-4\,a^3\,A\,b^3\,\mathrm{Sin}[2\,c+d\,x]+$$
$$a\,A\,b^5\,\mathrm{Sin}[2\,c+d\,x]+2\,a^4\,b^2\,B\,\mathrm{Sin}[2\,c+d\,x]+a^2\,b^4\,B\,\mathrm{Sin}[2\,c+d\,x]-3\,a^3\,b^3\,C\,\mathrm{Sin}[2\,c+d\,x]+5\,a^2\,A\,b^4\,\mathrm{Sin}[c+2\,d\,x]-$$
$$2\,A\,b^6\,\mathrm{Sin}[c+2\,d\,x]-3\,a^3\,b^3\,B\,\mathrm{Sin}[c+2\,d\,x]+a^4\,b^2\,C\,\mathrm{Sin}[c+2\,d\,x]+2\,a^2\,b^4\,C\,\mathrm{Sin}[c+2\,d\,x]\big)\Big)\Big/$$
$$\left(2\,a^2\,b\,\left(a^2-b^2\right)^2\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 1001: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^4\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+b\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 649 leaves, 8 steps):

$$\frac{\left(2\,A\,b^2-8\,a\,b\,B+20\,a^2\,C+b^2\,C\right)\,x}{2\,b^6}+\Big(a\,\left(8\,A\,b^8+8\,a^7\,b\,B-28\,a^5\,b^3\,B+35\,a^3\,b^5\,B-20\,a\,b^7\,B-a^6\,b^2\,(2\,A-69\,C)+7\,a^4\,b^4\,(A-12\,C)-8\,a^2\,b^6\,(A-5\,C)-20\,a^8\,C\right)$$

$$\mathrm{ArcTan}\Big[\frac{\sqrt{a-b}\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]}{\sqrt{a+b}}\Big]\Big)\Big/\left(\sqrt{a-b}\,b^6\,\sqrt{a+b}\,\left(a^2-b^2\right)^3\,d\right)+\frac{1}{6\,b^5\,\left(a^2-b^2\right)^3\,d}$$

$$\left(24\,a^6\,b\,B-68\,a^4\,b^3\,B+65\,a^2\,b^5\,B-6\,b^7\,B-a^5\,b^2\,(6\,A-167\,C)+a^3\,b^4\,(17\,A-146\,C)-2\,a\,b^6\,(13\,A-12\,C)-60\,a^7\,C\right)\,\mathrm{Sin}[c+d\,x]-$$

$$\frac{1}{2\,b^4\,\left(a^2-b^2\right)^3\,d}\left(4\,a^5\,b\,B-11\,a^3\,b^3\,B+12\,a\,b^5\,B-a^4\,b^2\,(A-27\,C)+a^2\,b^4\,(2\,A-23\,C)-b^6\,(6\,A-C)-10\,a^6\,C\right)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]-$$

$$\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\mathrm{Cos}[c+d\,x]^4\,\mathrm{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^3}+\frac{\left(4\,A\,b^4+2\,a^3\,b\,B-7\,a\,b^3\,B-5\,a^4\,C+a^2\,b^2\,(A+10\,C)\right)\,\mathrm{Cos}[c+d\,x]^3\,\mathrm{Sin}[c+d\,x]}{6\,b^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^2}-$$

$$\left(\left(12\,A\,b^6-8\,a^5\,b\,B+20\,a^3\,b^3\,B-27\,a\,b^5\,B+a^4\,b^2\,(2\,A-53\,C)+20\,a^6\,C+a^2\,b^4\,(A+48\,C)\right)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{Sin}[c+d\,x]\right)\Big/\left(6\,b^3\,\left(a^2-b^2\right)^3\,d\,(a+b\,\mathrm{Cos}[c+d\,x])\right)$$

Result (type 3, 658 leaves) :

$$\frac{\left(2\,A\,b^2-8\,a\,b\,B+20\,a^2\,C+b^2\,C\right)\,(c+d\,x)}{2\,b^6\,d}+\frac{1}{b^6\,\left(a^2-b^2\right)^3\,\sqrt{-a^2+b^2}\,d}$$

$$a\,\left(2\,a^6\,A\,b^2-7\,a^4\,A\,b^4+8\,a^2\,A\,b^6-8\,A\,b^8-8\,a^7\,b\,B+28\,a^5\,b^3\,B-35\,a^3\,b^5\,B+20\,a\,b^7\,B+20\,a^8\,C-69\,a^6\,b^2\,C+84\,a^4\,b^4\,C-40\,a^2\,b^6\,C\right)$$

$$\mathrm{ArcTanh}\Big[\frac{(a-b)\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]}{\sqrt{-a^2+b^2}}\Big]+\frac{(-b\,B+4\,a\,C)\,\left(-\frac{i\,\mathrm{Cos}[c+d\,x]}{2\,b^5}-\frac{\mathrm{Sin}[c+d\,x]}{2\,b^5}\right)}{d}+$$

$$\frac{(-b\,B+4\,a\,C)\,\left(\frac{i\,\mathrm{Cos}[c+d\,x]}{2\,b^5}-\frac{\mathrm{Sin}[c+d\,x]}{2\,b^5}\right)}{d}+\frac{a^4\,A\,b^2\,\mathrm{Sin}[c+d\,x]-a^5\,b\,B\,\mathrm{Sin}[c+d\,x]+a^6\,C\,\mathrm{Sin}[c+d\,x]}{3\,b^5\,\left(-a^2+b^2\right)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\left(7\,a^5\,A\,b^2\,\mathrm{Sin}[c+d\,x]-12\,a^3\,A\,b^4\,\mathrm{Sin}[c+d\,x]-10\,a^6\,b\,B\,\mathrm{Sin}[c+d\,x]+15\,a^4\,b^3\,B\,\mathrm{Sin}[c+d\,x]+13\,a^7\,C\,\mathrm{Sin}[c+d\,x]-18\,a^5\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)\Big/\left(6\,b^5\,\left(-a^2+b^2\right)^2\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)+$$

$$\Big(11\,a^6\,A\,b^2\,\mathrm{Sin}[c+d\,x]-32\,a^4\,A\,b^4\,\mathrm{Sin}[c+d\,x]+36\,a^2\,A\,b^6\,\mathrm{Sin}[c+d\,x]-26\,a^7\,b\,B\,\mathrm{Sin}[c+d\,x]+71\,a^5\,b^3\,B\,\mathrm{Sin}[c+d\,x]-60\,a^3\,b^5\,B\,\mathrm{Sin}[c+d\,x]+$$

$$47\,a^8\,C\,\mathrm{Sin}[c+d\,x]-122\,a^6\,b^2\,C\,\mathrm{Sin}[c+d\,x]+90\,a^4\,b^4\,C\,\mathrm{Sin}[c+d\,x]\Big)\Big/\left(6\,b^5\,\left(-a^2+b^2\right)^3\,d\,(a+b\,\mathrm{Cos}[c+d\,x])\right)+\frac{C\,\mathrm{Sin}[2\,(c+d\,x)]}{4\,b^4\,d}$$

- **Problem 1003: Result more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^2\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{(a+b\,\mathrm{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 349 leaves, 6 steps) :

$$\frac{C\,x}{b^4}-\frac{\left(3\,a^2\,b^5\,B+2\,b^7\,B-a^3\,b^4\,(A-8\,C)+2\,a^7\,C-7\,a^5\,b^2\,C-4\,a\,b^6\,(A+2\,C)\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{(a-b)^{7/2}\,b^4\,(a+b)^{7/2}\,d}-$$
$$\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{Cos}[c+d\,x]^2\,\text{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^3}-\frac{a\,\left(2\,A\,b^4-5\,a\,b^3\,B-3\,a^4\,C+a^2\,b^2\,(3\,A+8\,C)\right)\,\text{Sin}[c+d\,x]}{6\,b^3\,\left(a^2-b^2\right)^2\,d\,(a+b\,\text{Cos}[c+d\,x])^2}-$$
$$\frac{\left(4\,A\,b^6+a^3\,b^3\,B-16\,a\,b^5\,B+9\,a^6\,C+2\,a^2\,b^4\,(7\,A+17\,C)-a^4\,b^2\,(3\,A+28\,C)\right)\,\text{Sin}[c+d\,x]}{6\,b^3\,\left(a^2-b^2\right)^3\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 915 leaves):

$$\frac{\left(-a^3\,A\,b^4-4\,a\,A\,b^6+3\,a^2\,b^5\,B+2\,b^7\,B+2\,a^7\,C-7\,a^5\,b^2\,C+8\,a^3\,b^4\,C-8\,a\,b^6\,C\right)\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{-a^2+b^2}}\right]}{b^4\,\left(a^2-b^2\right)^3\,\sqrt{-a^2+b^2}\,d}+$$
$$\frac{1}{24\,b^4\,\left(-a^2+b^2\right)^3\,d\,(a+b\,\text{Cos}[c+d\,x])^3}\left(-24\,a^9\,C\,(c+d\,x)+36\,a^7\,b^2\,C\,(c+d\,x)+36\,a^5\,b^4\,C\,(c+d\,x)-84\,a^3\,b^6\,C\,(c+d\,x)+\right.$$
$$36\,a\,b^8\,C\,(c+d\,x)-72\,a^8\,b\,C\,(c+d\,x)\,\text{Cos}[c+d\,x]+198\,a^6\,b^3\,C\,(c+d\,x)\,\text{Cos}[c+d\,x]-162\,a^4\,b^5\,C\,(c+d\,x)\,\text{Cos}[c+d\,x]+$$
$$18\,a^2\,b^7\,C\,(c+d\,x)\,\text{Cos}[c+d\,x]+18\,b^9\,C\,(c+d\,x)\,\text{Cos}[c+d\,x]-36\,a^7\,b^2\,C\,(c+d\,x)\,\text{Cos}[2\,(c+d\,x)]+108\,a^5\,b^4\,C\,(c+d\,x)\,\text{Cos}[2\,(c+d\,x)]-$$
$$108\,a^3\,b^6\,C\,(c+d\,x)\,\text{Cos}[2\,(c+d\,x)]+36\,a\,b^8\,C\,(c+d\,x)\,\text{Cos}[2\,(c+d\,x)]-6\,a^6\,b^3\,C\,(c+d\,x)\,\text{Cos}[3\,(c+d\,x)]+$$
$$18\,a^4\,b^5\,C\,(c+d\,x)\,\text{Cos}[3\,(c+d\,x)]-18\,a^2\,b^7\,C\,(c+d\,x)\,\text{Cos}[3\,(c+d\,x)]+6\,b^9\,C\,(c+d\,x)\,\text{Cos}[3\,(c+d\,x)]+51\,a^4\,A\,b^5\,\text{Sin}[c+d\,x]+$$
$$18\,a^2\,A\,b^7\,\text{Sin}[c+d\,x]+6\,A\,b^9\,\text{Sin}[c+d\,x]-18\,a^5\,b^4\,B\,\text{Sin}[c+d\,x]-39\,a^3\,b^6\,B\,\text{Sin}[c+d\,x]-18\,a\,b^8\,B\,\text{Sin}[c+d\,x]+24\,a^8\,b\,C\,\text{Sin}[c+d\,x]-$$
$$57\,a^6\,b^3\,C\,\text{Sin}[c+d\,x]+72\,a^4\,b^5\,C\,\text{Sin}[c+d\,x]+36\,a^2\,b^7\,C\,\text{Sin}[c+d\,x]-6\,a^5\,A\,b^4\,\text{Sin}[2\,(c+d\,x)]+54\,a^3\,A\,b^6\,\text{Sin}[2\,(c+d\,x)]+$$
$$12\,a\,A\,b^8\,\text{Sin}[2\,(c+d\,x)]-6\,a^4\,b^5\,B\,\text{Sin}[2\,(c+d\,x)]-54\,a^2\,b^7\,B\,\text{Sin}[2\,(c+d\,x)]+30\,a^7\,b^2\,C\,\text{Sin}[2\,(c+d\,x)]-90\,a^5\,b^4\,C\,\text{Sin}[2\,(c+d\,x)]+$$
$$120\,a^3\,b^6\,C\,\text{Sin}[2\,(c+d\,x)]-a^4\,A\,b^5\,\text{Sin}[3\,(c+d\,x)]+10\,a^2\,A\,b^7\,\text{Sin}[3\,(c+d\,x)]+6\,A\,b^9\,\text{Sin}[3\,(c+d\,x)]-2\,a^5\,b^4\,B\,\text{Sin}[3\,(c+d\,x)]+$$
$$\left.5\,a^3\,b^6\,B\,\text{Sin}[3\,(c+d\,x)]-18\,a\,b^8\,B\,\text{Sin}[3\,(c+d\,x)]+11\,a^6\,b^3\,C\,\text{Sin}[3\,(c+d\,x)]-32\,a^4\,b^5\,C\,\text{Sin}[3\,(c+d\,x)]+36\,a^2\,b^7\,C\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 1006: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^4}\,dx$$

Optimal (type 3, 345 leaves, 7 steps):

$$-\frac{\left(7\,a^2\,A\,b^5-2\,A\,b^7-2\,a^7\,B-3\,a^5\,b^2\,B-a^4\,b^3\,(8\,A-C)+4\,a^6\,b\,(2\,A+C)\right)\,\text{ArcTan}\left[\frac{\sqrt{a-b}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{a+b}}\right]}{a^4\,(a-b)^{7/2}\,(a+b)^{7/2}\,d}+$$
$$\frac{A\,\text{ArcTanh}[\text{Sin}[c+d\,x]]}{a^4\,d}+\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^3}-\frac{\left(3\,A\,b^4+5\,a^3\,b\,B-2\,a^4\,C-a^2\,b^2\,(8\,A+3\,C)\right)\,\text{Sin}[c+d\,x]}{6\,a^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,\text{Cos}[c+d\,x])^2}-$$
$$\frac{\left(17\,a^2\,A\,b^4-6\,A\,b^6+11\,a^5\,b\,B+4\,a^3\,b^3\,B-2\,a^6\,C-13\,a^4\,b^2\,(2\,A+C)\right)\,\text{Sin}[c+d\,x]}{6\,a^3\,\left(a^2-b^2\right)^3\,d\,(a+b\,\text{Cos}[c+d\,x])}$$

Result (type 3, 1256 leaves):

$$-\frac{2\,A\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]-\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{a^4\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{2\,A\,\mathrm{Cos}[c+d\,x]\,\mathrm{Log}\left[\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]+\mathrm{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\right]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])}{a^4\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{1}{\left(a^2-b^2\right)^3\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}\left(-8\,a^6\,A\,b+8\,a^4\,A\,b^3-7\,a^2\,A\,b^5+2\,A\,b^7+2\,a^7\,B+3\,a^5\,b^2\,B-4\,a^6\,b\,C-a^4\,b^3\,C\right)\,\mathrm{Cos}[c+d\,x]$$

$$(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\,\left(-\left(2\,i\,\mathrm{ArcTan}\left[\mathrm{Sec}\left[\frac{d\,x}{2}\right]\,\left(\frac{\mathrm{Cos}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+i\,a^2\,\mathrm{Sin}[2\,c]-i\,b^2\,\mathrm{Sin}[2\,c]}}-\right.\right.\right.\right.$$

$$\left.\left.\left.\frac{i\,\mathrm{Sin}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+i\,a^2\,\mathrm{Sin}[2\,c]-i\,b^2\,\mathrm{Sin}[2\,c]}}\right)\,\left(-i\,a\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+i\,b\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]\right)\right]\,\mathrm{Cos}[c]\right)\Big/$$

$$\left(a^4\,d\,\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+i\,a^2\,\mathrm{Sin}[2\,c]-i\,b^2\,\mathrm{Sin}[2\,c]}\right)-\left(2\,\mathrm{ArcTan}\left[\mathrm{Sec}\left[\frac{d\,x}{2}\right]\right.\right.$$

$$\left(\frac{\mathrm{Cos}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+i\,a^2\,\mathrm{Sin}[2\,c]-i\,b^2\,\mathrm{Sin}[2\,c]}}-\frac{i\,\mathrm{Sin}[c]}{\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+i\,a^2\,\mathrm{Sin}[2\,c]-i\,b^2\,\mathrm{Sin}[2\,c]}}\right)$$

$$\left.\left.\left(-i\,a\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+i\,b\,\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]\right)\right]\,\mathrm{Sin}[c]\right)\Big/\left(a^4\,d\,\sqrt{-a^2\,\mathrm{Cos}[2\,c]+b^2\,\mathrm{Cos}[2\,c]+i\,a^2\,\mathrm{Sin}[2\,c]-i\,b^2\,\mathrm{Sin}[2\,c]}\right)\right)-$$

$$\left(2\,\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}[c]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\,\left(a\,A\,b^2\,\mathrm{Sin}[c]-a^2\,b\,B\,\mathrm{Sin}[c]+a^3\,C\,\mathrm{Sin}[c]-\right.\right.$$
$$\left.\left.A\,b^3\,\mathrm{Sin}[d\,x]+a\,b^2\,B\,\mathrm{Sin}[d\,x]-a^2\,b\,C\,\mathrm{Sin}[d\,x]\right)\right)\Big/$$
$$\left(3\,a\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^3\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$
$$\left(\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}[c]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\,\left(-6\,a^3\,A\,b\,\mathrm{Sin}[c]+a\,A\,b^3\,\mathrm{Sin}[c]+3\,a^4\,B\,\mathrm{Sin}[c]+2\,a^2\,b^2\,B\,\mathrm{Sin}[c]-\right.\right.$$
$$\left.\left.5\,a^3\,b\,C\,\mathrm{Sin}[c]+8\,a^2\,A\,b^2\,\mathrm{Sin}[d\,x]-3\,A\,b^4\,\mathrm{Sin}[d\,x]-5\,a^3\,b\,B\,\mathrm{Sin}[d\,x]+2\,a^4\,C\,\mathrm{Sin}[d\,x]+3\,a^2\,b^2\,C\,\mathrm{Sin}[d\,x]\right)\right)\Big/$$
$$\left(3\,a^2\,\left(a^2-b^2\right)^2\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^2\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)+$$
$$\left(\mathrm{Cos}[c+d\,x]\,\mathrm{Sec}[c]\,(B+C\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x])\right.$$
$$\left(-18\,a^5\,A\,b\,\mathrm{Sin}[c]+6\,a^3\,A\,b^3\,\mathrm{Sin}[c]-3\,a\,A\,b^5\,\mathrm{Sin}[c]+6\,a^6\,B\,\mathrm{Sin}[c]+9\,a^4\,b^2\,B\,\mathrm{Sin}[c]-12\,a^5\,b\,C\,\mathrm{Sin}[c]-3\,a^3\,b^3\,C\,\mathrm{Sin}[c]+\right.$$
$$\left.\left.26\,a^4\,A\,b^2\,\mathrm{Sin}[d\,x]-17\,a^2\,A\,b^4\,\mathrm{Sin}[d\,x]+6\,A\,b^6\,\mathrm{Sin}[d\,x]-11\,a^5\,b\,B\,\mathrm{Sin}[d\,x]-4\,a^3\,b^3\,B\,\mathrm{Sin}[d\,x]+2\,a^6\,C\,\mathrm{Sin}[d\,x]+13\,a^4\,b^2\,C\,\mathrm{Sin}[d\,x]\right)\right)\Big/$$
$$\left(3\,a^3\,\left(a^2-b^2\right)^3\,d\,(a+b\,\mathrm{Cos}[c+d\,x])\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])\right)$$

- **Problem 1007: Result more than twice size of optimal antiderivative.**

$$\int \frac{\left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^2}{(a + b \operatorname{Cos}[c + d x])^4} \, dx$$

Optimal (type 3, 480 leaves, 8 steps):

$$-\frac{1}{a^5 (a-b)^{7/2} (a+b)^{7/2} d}$$

$$\left(35 a^4 A b^4 - 28 a^2 A b^6 + 8 A b^8 + 8 a^7 b B - 8 a^5 b^3 B + 7 a^3 b^5 B - 2 a b^7 B - 2 a^8 C - a^6 b^2 (20 A + 3 C)\right) \operatorname{ArcTan}\left[\frac{\sqrt{a-b} \operatorname{Tan}\left[\frac{1}{2} (c + d x)\right]}{\sqrt{a+b}}\right] -$$

$$\frac{(4 A b - a B) \operatorname{ArcTanh}[\operatorname{Sin}[c + d x]]}{a^5 d} + \frac{\left(68 a^2 A b^4 - 24 A b^6 + 26 a^5 b B - 17 a^3 b^3 B + 6 a b^5 B + a^6 (6 A - 11 C) - a^4 b^2 (65 A + 4 C)\right) \operatorname{Tan}[c + d x]}{6 a^4 \left(a^2 - b^2\right)^3 d} +$$

$$\frac{\left(A b^2 - a (b B - a C)\right) \operatorname{Tan}[c + d x]}{3 a \left(a^2 - b^2\right) d (a + b \operatorname{Cos}[c + d x])^3} - \frac{\left(4 A b^4 + 6 a^3 b B - a b^3 B - 3 a^4 C - a^2 b^2 (9 A + 2 C)\right) \operatorname{Tan}[c + d x]}{6 a^2 \left(a^2 - b^2\right)^2 d (a + b \operatorname{Cos}[c + d x])^2} -$$

$$\frac{\left(11 a^2 A b^4 - 4 A b^6 + 6 a^5 b B - 2 a^3 b^3 B + a b^5 B - 2 a^6 C - 3 a^4 b^2 (4 A + C)\right) \operatorname{Tan}[c + d x]}{2 a^3 \left(a^2 - b^2\right)^3 d (a + b \operatorname{Cos}[c + d x])}$$

Result (type 3, 1113 leaves):

$$-\left(2\left(20 a^6 A b^2-35 a^4 A b^4+28 a^2 A b^6-8 A b^8-8 a^7 b B+8 a^5 b^3 B-7 a^3 b^5 B+2 a b^7 B+2 a^8 C+3 a^6 b^2 C\right) \operatorname{ArcTanh}\left[\frac{(a-b) \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{-a^2+b^2}}\right]\right.$$

$$\left.\operatorname{Cos}[c+d x]^2\left(C+B \operatorname{Sec}[c+d x]+A \operatorname{Sec}[c+d x]^2\right)\right) \Big/ \left(a^5\left(a^2-b^2\right)^3 \sqrt{-a^2+b^2}\, d\,(2 A+C+2 B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[2 c+2 d x])\right)-$$

$$\left(2(-4 A b+a B) \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\left(C+B \operatorname{Sec}[c+d x]+A \operatorname{Sec}[c+d x]^2\right)\right) \Big/$$
$$\left(a^5 d\,(2 A+C+2 B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[2 c+2 d x])\right)+$$

$$\left(2(-4 A b+a B) \operatorname{Cos}[c+d x]^2 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]+\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right]\left(C+B \operatorname{Sec}[c+d x]+A \operatorname{Sec}[c+d x]^2\right)\right) \Big/$$
$$\left(a^5 d\,(2 A+C+2 B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[2 c+2 d x])\right)+$$

$$\left(\operatorname{Cos}[c+d x]\left(C+B \operatorname{Sec}[c+d x]+A \operatorname{Sec}[c+d x]^2\right)\left(48 a^9 A \operatorname{Sin}[c+d x]-108 a^7 A b^2 \operatorname{Sin}[c+d x]-174 a^5 A b^4 \operatorname{Sin}[c+d x]+\right.\right.$$
$$294 a^3 A b^6 \operatorname{Sin}[c+d x]-120 a A b^8 \operatorname{Sin}[c+d x]+120 a^6 b^3 B \operatorname{Sin}[c+d x]-90 a^4 b^5 B \operatorname{Sin}[c+d x]+30 a^2 b^7 B \operatorname{Sin}[c+d x]-$$
$$54 a^7 b^2 C \operatorname{Sin}[c+d x]-6 a^5 b^4 C \operatorname{Sin}[c+d x]+72 a^8 A b \operatorname{Sin}[2(c+d x)]-444 a^6 A b^3 \operatorname{Sin}[2(c+d x)]+370 a^4 A b^5 \operatorname{Sin}[2(c+d x)]-$$
$$40 a^2 A b^7 \operatorname{Sin}[2(c+d x)]-48 A b^9 \operatorname{Sin}[2(c+d x)]+144 a^7 b^2 B \operatorname{Sin}[2(c+d x)]-76 a^5 b^4 B \operatorname{Sin}[2(c+d x)]+10 a^3 b^6 B \operatorname{Sin}[2(c+d x)]+$$
$$12 a b^8 B \operatorname{Sin}[2(c+d x)]-72 a^8 b C \operatorname{Sin}[2(c+d x)]-2 a^6 b^3 C \operatorname{Sin}[2(c+d x)]-16 a^4 b^5 C \operatorname{Sin}[2(c+d x)]+36 a^7 A b^2 \operatorname{Sin}[3(c+d x)]-$$
$$318 a^5 A b^4 \operatorname{Sin}[3(c+d x)]+342 a^3 A b^6 \operatorname{Sin}[3(c+d x)]-120 a A b^8 \operatorname{Sin}[3(c+d x)]+120 a^6 b^3 B \operatorname{Sin}[3(c+d x)]-$$
$$90 a^4 b^5 B \operatorname{Sin}[3(c+d x)]+30 a^2 b^7 B \operatorname{Sin}[3(c+d x)]-54 a^7 b^2 C \operatorname{Sin}[3(c+d x)]-6 a^5 b^4 C \operatorname{Sin}[3(c+d x)]+$$
$$6 a^6 A b^3 \operatorname{Sin}[4(c+d x)]-65 a^4 A b^5 \operatorname{Sin}[4(c+d x)]+68 a^2 A b^7 \operatorname{Sin}[4(c+d x)]-24 A b^9 \operatorname{Sin}[4(c+d x)]+26 a^5 b^4 B \operatorname{Sin}[4(c+d x)]-$$
$$\left.\left.17 a^3 b^6 B \operatorname{Sin}[4(c+d x)]+6 a b^8 B \operatorname{Sin}[4(c+d x)]-11 a^6 b^3 C \operatorname{Sin}[4(c+d x)]-4 a^4 b^5 C \operatorname{Sin}[4(c+d x)]\right)\right) \Big/$$
$$\left(24 a^4\left(a^2-b^2\right)^3 d\,(a+b \operatorname{Cos}[c+d x])^3(2 A+C+2 B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[2 c+2 d x])\right)$$

- **Problem 1017: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b \operatorname{Cos}[c+d x]}\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]\, dx$$

Optimal (type 4, 240 leaves, 9 steps):

$$\frac{2(3 b B+a C) \sqrt{a+b \operatorname{Cos}[c+d x]}\, \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 b d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+\frac{2\left(3 A b^2-\left(a^2-b^2\right) C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\, \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 b d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{2 a A \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\, \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2 C \sqrt{a+b \operatorname{Cos}[c+d x]}\, \operatorname{Sin}[c+d x]}{3 d}$$

Result (type 4, 508 leaves):

$$\frac{2\,C\,\sqrt{a+b\,Cos[c+d\,x]}\;Sin[c+d\,x]}{3\,d}+$$

$$\frac{1}{6\,d}\left(\frac{2\,(6\,A\,b+6\,a\,B+2\,b\,C)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}+\frac{2\,(6\,a\,A+3\,b\,B+a\,C)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,Cos[c+d\,x]}}-\right.$$

$$\left(2\,i\,(3\,b\,B+a\,C)\,\sqrt{\frac{b-b\,Cos[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,Cos[c+d\,x]}{a-b}}\;Cos[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,EllipticE\left[i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,EllipticF\left[i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\,EllipticPi\left[\frac{a+b}{a},\,i\,ArcSinh\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,Cos[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,Sin[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-Cos[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,Cos[c+d\,x])+(a+b\,Cos[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,Cos[c+d\,x])+2\,(a+b\,Cos[c+d\,x])^2\right)\right)\right)$$

- **Problem 1018: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,Cos[c+d\,x]}\,\left(A+B\,Cos[c+d\,x]+C\,Cos[c+d\,x]^2\right)\,Sec[c+d\,x]^2\,dx$$

Optimal (type 4, 217 leaves, 9 steps):

$$-\frac{(A-2\,C)\,\sqrt{a+b\,Cos[c+d\,x]}\;EllipticE\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}}+\frac{(a\,A+2\,b\,B)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,Cos[c+d\,x]}}+$$

$$\frac{(A\,b+2\,a\,B)\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,Cos[c+d\,x]}}+\frac{A\,\sqrt{a+b\,Cos[c+d\,x]}\;Tan[c+d\,x]}{d}$$

Result (type 4, 385 leaves):

$$\frac{1}{4 d}\left(\frac{8 (b B+a C) \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}} \text{EllipticF}\left[\frac{1}{2} (c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b \text{Cos}[c+d x]}}+\right.$$

$$\frac{2 (A b+4 a B+2 b C) \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}} \text{EllipticPi}\left[2,\frac{1}{2} (c+d x),\frac{2 b}{a+b}\right]}{\sqrt{a+b \text{Cos}[c+d x]}}-\frac{1}{a b \sqrt{-\frac{1}{a+b}}}2 i (A-2 C) \sqrt{-\frac{b (-1+\text{Cos}[c+d x])}{a+b}}$$

$$\sqrt{\frac{b (1+\text{Cos}[c+d x])}{-a+b}} \text{Csc}[c+d x] \left(-2 a (a-b) \text{EllipticE}\left[i \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+\right.$$

$$b \left(-2 a \text{EllipticF}\left[i \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]+\right.$$

$$\left.\left.\left.b \text{EllipticPi}\left[\frac{a+b}{a},i \text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \text{Cos}[c+d x]}\right],\frac{a+b}{a-b}\right]\right)\right)+4 A \sqrt{a+b \text{Cos}[c+d x]} \text{Tan}[c+d x]\right)$$

- **Problem 1019: Result unnecessarily involves imaginary or complex numbers.**

$$\int \sqrt{a+b \text{Cos}[c+d x]} \left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^3 \, dx$$

Optimal (type 4, 299 leaves, 10 steps):

$$-\frac{(A b+4 a B) \sqrt{a+b \text{Cos}[c+d x]} \text{EllipticE}\left[\frac{1}{2} (c+d x),\frac{2 b}{a+b}\right]}{4 a d \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}}}+\frac{(3 A b+4 a B+8 b C) \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}} \text{EllipticF}\left[\frac{1}{2} (c+d x),\frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \text{Cos}[c+d x]}}-$$

$$\frac{\left(A b^2-4 a b B-4 a^2 (A+2 C)\right) \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}} \text{EllipticPi}\left[2,\frac{1}{2} (c+d x),\frac{2 b}{a+b}\right]}{4 a d \sqrt{a+b \text{Cos}[c+d x]}}+$$

$$\frac{(A b+4 a B) \sqrt{a+b \text{Cos}[c+d x]} \text{Tan}[c+d x]}{4 a d}+\frac{A \sqrt{a+b \text{Cos}[c+d x]} \text{Sec}[c+d x] \text{Tan}[c+d x]}{2 d}$$

Result (type 4, 566 leaves) :

$$\frac{1}{16\,a\,d}\left(\frac{2\,(4\,a\,A\,b+16\,a\,b\,C)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(8\,a^2\,A-3\,A\,b^2+4\,a\,b\,B+16\,a^2\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathbb{i}\,\left(-A\,b^2-4\,a\,b\,B\right)\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[\mathbb{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathbb{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\,\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{\text{Sec}[c+d\,x]\,(A\,b\,\text{Sin}[c+d\,x]+4\,a\,B\,\text{Sin}[c+d\,x])}{4\,a}+\frac{1}{2}\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 1020: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 399 leaves, 11 steps) :

$$\frac{\left(3 A b^2-6 a b B-8 a^2 (2 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{24 a^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}-$$

$$\frac{\left(A b^2-18 a b B-8 a^2 (2 A+3 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{24 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(A b^3+8 a^3 B-2 a b^2 B+4 a^2 b (A+2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{8 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{\left(3 A b^2-6 a b B-8 a^2 (2 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Tan}[c+d x]}{24 a^2 d}+$$

$$\frac{(A b+6 a B) \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{12 a d}+\frac{A \sqrt{a+b \operatorname{Cos}[c+d x]}\ \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 661 leaves) :

$$\frac{1}{96 a^2 d}\left(\frac{2 \left(4 a A b^2+24 a^2 b B\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\right.$$

$$\frac{2 \left(8 a^2 A b+9 A b^3+48 a^3 B-18 a b^2 B+24 a^2 b C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\left(2 i \left(-16 a^2 A b+3 A b^3-6 a b^2 B-24 a^2 b C\right) \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2 (c+d x)]\right.$$

$$\left(2 a (a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b \left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\left.\frac{a+b}{a-b}\right]-b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\right) \Bigg/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a (a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}} \left(2 a^2-b^2-4 a (a+b \operatorname{Cos}[c+d x])+2 (a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{\operatorname{Sec}[c+d x]^2 (A b \operatorname{Sin}[c+d x]+6 a B \operatorname{Sin}[c+d x])}{12 a}+\right.$$

$$\left.\frac{\operatorname{Sec}[c+d x] \left(16 a^2 A \operatorname{Sin}[c+d x]-3 A b^2 \operatorname{Sin}[c+d x]+6 a b B \operatorname{Sin}[c+d x]+24 a^2 C \operatorname{Sin}[c+d x]\right)}{24 a^2}+\frac{1}{3} A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\right)$$

- **Problem 1024: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b \operatorname{Cos}[c+d x])^{3/2} \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x] \, dx$$

Optimal (type 4, 306 leaves, 10 steps):

$$\frac{2\left(15\,A\,b^2+20\,a\,b\,B+3\,a^2\,C+9\,b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{15\,b\,d\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{2\left(5\,a^2\,b\,B-5\,b^3\,B+3\,a^3\,C-3\,a\,b^2\,(5\,A+C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{15\,b\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,a^2\,A\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\,(5\,b\,B+3\,a\,C)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{15\,d}+\frac{2\,C\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 4, 455 leaves) :

$$\frac{1}{30\,d}\left(\frac{4\left(15\,a^2\,B+5\,b^2\,B+6\,a\,b\,(5\,A+2\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(20\,a\,b\,B+3\,a^2\,(10\,A+C)+3\,b^2\,(5\,A+3\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{1}{a\,b^2\sqrt{-\frac{1}{a+b}}}\,2\,i\left(15\,A\,b^2+20\,a\,b\,B+3\,a^2\,C+9\,b^2\,C\right)\sqrt{-\frac{b\,(-1+\text{Cos}[c+d\,x])}{a+b}}\sqrt{\frac{b\,(1+\text{Cos}[c+d\,x])}{-a+b}}$$

$$\text{Csc}[c+d\,x]\left(-2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(-2\,a\,\text{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.\left.i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\,\text{EllipticPi}\left[\frac{a+b}{a},i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)+$$

$$\left.4\sqrt{a+b\,\text{Cos}[c+d\,x]}\ (5\,b\,B+6\,a\,C+3\,b\,C\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]\right)$$

## Problem 1025: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 286 leaves, 10 steps) :

$$-\frac{(3\,a\,A-6\,b\,B-8\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(6\,a\,b\,B+a^2\,(3\,A-2\,C)+2\,b^2\,(3\,A+C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{3\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a\,(3\,A\,b+2\,a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\frac{b\,(3\,A-2\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,d}+\frac{A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Tan}[c+d\,x]}{d}$$

Result (type 4, 551 leaves) :

$$\frac{1}{12\,d}\left(\frac{2\left(12\,A\,b^2+24\,a\,b\,B+12\,a^2\,C+4\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(15\,a\,A\,b+12\,a^2\,B+6\,b^2\,B+8\,a\,b\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\left(-3\,a\,A\,b+6\,b^2\,B+8\,a\,b\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{2}{3}\,b\,C\,\text{Sin}[c+d\,x]+a\,A\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 1026: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 307 leaves, 10 steps) :

$$-\frac{(5 A b+4 a B-8 b C) \sqrt{a+b \operatorname{Cos}[c+d x]} \text{ EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(4 a^2 B+8 b^2 B+a b (7 A+8 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \text{ EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(3 A b^2+12 a b B+4 a^2 (A+2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \text{ EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{4 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{(3 A b+4 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{4 d}+\frac{A (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 d}$$

Result (type 4, 579 leaves) :

$$\frac{1}{16\,d}\left(\frac{2\left(4\,a\,A\,b+16\,b^2\,B+32\,a\,b\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(8\,a^2\,A+A\,b^2+20\,a\,b\,B+16\,a^2\,C+8\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\,\left(-5\,A\,b^2-4\,a\,b\,B+8\,b^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{4}\,\mathrm{Sec}[c+d\,x]\,(5\,A\,b\,\mathrm{Sin}[c+d\,x]+4\,a\,B\,\mathrm{Sin}[c+d\,x])+\frac{1}{2}\,a\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 1027: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 399 leaves, 11 steps) :

$$-\frac{\left(3 A b^2+30 a b B+8 a^2 (2 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{24 a d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{\left(42 a b B+8 a^2 (2 A+3 C)+b^2 (17 A+48 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{24 d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{\left(A b^3-8 a^3 B-6 a b^2 B-12 a^2 b (A+2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{8 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(3 A b^2+30 a b B+8 a^2 (2 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{24 a d}+$$

$$\frac{(A b+2 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{4 d}+\frac{A (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{3 d}$$

Result (type 4, 667 leaves) :

$$\frac{1}{96\,a\,d}\left(\frac{2\left(28\,a\,A\,b^2+24\,a^2\,b\,B+96\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(56\,a^2\,A\,b-9\,A\,b^3+48\,a^3\,B+6\,a\,b^2\,B+120\,a^2\,b\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-$$

$$\left(2\,i\left(-16\,a^2\,A\,b-3\,A\,b^3-30\,a\,b^2\,B-24\,a^2\,b\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{12}\,\mathrm{Sec}[c+d\,x]^2\,(7\,A\,b\,\mathrm{Sin}[c+d\,x]+6\,a\,B\,\mathrm{Sin}[c+d\,x])+\right.$$

$$\left.\frac{\mathrm{Sec}[c+d\,x]\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]+3\,A\,b^2\,\mathrm{Sin}[c+d\,x]+30\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+24\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{24\,a}+\frac{1}{3}\,a\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 1028: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 4, 503 leaves, 12 steps) :

$$\frac{\left(9 A b^3-128 a^3 B-24 a b^2 B-12 a^2 b (13 A+20 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{192 a^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}-$$

$$\frac{\left(3 A b^3-128 a^3 B-136 a b^2 B-12 a^2 b (19 A+28 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]}{192 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\left(\left(3 A b^4+96 a^3 b B-8 a b^3 B+24 a^2 b^2 (A+2 C)+16 a^4 (3 A+4 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c+d x), \frac{2 b}{a+b}\right]\right) \Big/$$

$$\left(64 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-\frac{\left(9 A b^3-128 a^3 B-24 a b^2 B-12 a^2 b (13 A+20 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{192 a^2 d}+$$

$$\frac{\left(3 A b^2+56 a b B+12 a^2 (3 A+4 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{96 a d}+$$

$$\frac{(3 A b+8 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{24 d}+\frac{A (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^3 \operatorname{Tan}[c+d x]}{4 d}$$

Result (type 4, 783 leaves) :

$$\frac{1}{768\,a^2\,d}\left(\frac{2\left(144\,a^3\,A\,b+12\,a\,A\,b^3+224\,a^2\,b^2\,B+192\,a^3\,b\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right.$$

$$2\left(288\,a^4\,A-12\,a^2\,A\,b^2+27\,A\,b^4+448\,a^3\,b\,B-72\,a\,b^3\,B+384\,a^4\,C+48\,a^2\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\left(-156\,a^2\,A\,b^2+9\,A\,b^4-128\,a^3\,b\,B-24\,a\,b^3\,B-240\,a^2\,b^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{24}\,\mathrm{Sec}[c+d\,x]^3\,(9\,A\,b\,\mathrm{Sin}[c+d\,x]+8\,a\,B\,\mathrm{Sin}[c+d\,x])+\right.$$

$$\frac{\mathrm{Sec}[c+d\,x]^2\left(36\,a^2\,A\,\mathrm{Sin}[c+d\,x]+3\,A\,b^2\,\mathrm{Sin}[c+d\,x]+56\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+48\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{96\,a}+$$

$$1\Big/\left(192\,a^2\right)\mathrm{Sec}[c+d\,x]\,\left(156\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]-9\,A\,b^3\,\mathrm{Sin}[c+d\,x]+128\,a^3\,B\,\mathrm{Sin}[c+d\,x]+24\,a\,b^2\,B\,\mathrm{Sin}[c+d\,x]+240\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\left.\frac{1}{4}\,a\,A\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 1032: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]\,dx$$

Optimal (type 4, 383 leaves, 11 steps):

$$\frac{2\left(161 a^2 b B+63 b^3 B+15 a^3 C+5 a b^2 (49 A+29 C)\right)\sqrt{a+b \text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{105 b d \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}}}-$$

$$\left(2\left(56 a^3 b B-56 a b^3 B-10 a^2 b^2 (7 A-C)+15 a^4 C-5 b^4 (7 A+5 C)\right)\sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]\right)\Big/$$

$$\left(105 b d \sqrt{a+b \text{Cos}[c+d x]}\right)+\frac{2 a^3 A \sqrt{\frac{a+b \text{Cos}[c+d x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}(c+d x),\frac{2 b}{a+b}\right]}{d \sqrt{a+b \text{Cos}[c+d x]}}+$$

$$\frac{2\left(35 A b^2+56 a b B+15 a^2 C+25 b^2 C\right)\sqrt{a+b \text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{105 d}+$$

$$\frac{2 (7 b B+5 a C)(a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{35 d}+\frac{2 C (a+b \text{Cos}[c+d x])^{5/2} \text{Sin}[c+d x]}{7 d}$$

Result (type 4, 652 leaves) :

$$\frac{1}{210\,d}\left(\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}2\left(630\,a^2\,A\,b+70\,A\,b^3+210\,a^3\,B+238\,a\,b^2\,B+270\,a^2\,b\,C+50\,b^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]+\right.$$

$$\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}2\left(210\,a^3\,A+245\,a\,A\,b^2+161\,a^2\,b\,B+63\,b^3\,B+15\,a^3\,C+145\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\,\left(245\,a\,A\,b^2+161\,a^2\,b\,B+63\,b^3\,B+15\,a^3\,C+145\,a\,b^2\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\Bigg/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{1}{210}\left(140\,A\,b^2+308\,a\,b\,B+180\,a^2\,C+115\,b^2\,C\right)\text{Sin}[c+d\,x]+\frac{1}{35}\,b\,(7\,b\,B+15\,a\,C)\,\text{Sin}[2\,(c+d\,x)]+\right.$$

$$\left.\frac{1}{14}\,b^2\,C\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 1033: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^2\,dx$$

Optimal (type 4, 357 leaves, 11 steps):

$$\frac{\left(70\,a\,b\,B-a^2\,(15\,A-46\,C)+6\,b^2\,(5\,A+3\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(20\,a^2\,b\,B+10\,b^3\,B+a^3\,(15\,A-16\,C)+4\,a\,b^2\,(15\,A+4\,C)\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{15\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a^2\,(5\,A\,b+2\,a\,B)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{b\,(15\,a\,A-10\,b\,B-16\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{15\,d}-$$

$$\frac{b\,(5\,A-2\,C)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Tan}[c+d\,x]}{d}$$

Result (type 4, 621 leaves) :

$$\frac{1}{60\,d}\left(\frac{2\left(180\,a\,A\,b^2+180\,a^2\,b\,B+20\,b^3\,B+60\,a^3\,C+68\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right.$$

$$2\left(135\,a^2\,A\,b+30\,A\,b^3+60\,a^3\,B+70\,a\,b^2\,B+46\,a^2\,b\,C+18\,b^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,\text{i}\,\left(-15\,a^2\,A\,b+30\,A\,b^3+70\,a\,b^2\,B+46\,a^2\,b\,C+18\,b^3\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\text{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{2}{15}\,b\,(5\,b\,B+11\,a\,C)\,\text{Sin}[c+d\,x]+\frac{1}{5}\,b^2\,C\,\text{Sin}[2\,(c+d\,x)]+a^2\,A\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 1034: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^3\,dx$$

Optimal (type 4, 372 leaves, 11 steps) :

$$-\frac{\left(12\,a^2\,B-24\,b^2\,B+a\,b\,(27\,A-56\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{12\,d\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(12\,a^3\,B+48\,a\,b^2\,B+8\,b^3\,(3\,A+C)+a^2\,b\,(33\,A+16\,C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{12\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{a\left(15\,A\,b^2+20\,a\,b\,B+4\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{b\,(21\,A\,b+12\,a\,B-8\,b\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{12\,d}+$$

$$\frac{(5\,A\,b+4\,a\,B)\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Tan}[c+d\,x]}{4\,d}+\frac{A\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,d}$$

Result (type 4, 636 leaves) :

$$\frac{1}{48\,d}\left(\frac{2\left(12\,a^2\,A\,b+48\,A\,b^3+144\,a\,b^2\,B+144\,a^2\,b\,C+16\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right.$$

$$2\left(24\,a^3\,A+63\,a\,A\,b^2+108\,a^2\,b\,B+24\,b^3\,B+48\,a^3\,C+56\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\left(-27\,a\,A\,b^2-12\,a^2\,b\,B+24\,b^3\,B+56\,a\,b^2\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{2}{3}\,b^2\,C\,\mathrm{Sin}[c+d\,x]+\frac{1}{4}\,\mathrm{Sec}[c+d\,x]\,\left(9\,a\,A\,b\,\mathrm{Sin}[c+d\,x]+4\,a^2\,B\,\mathrm{Sin}[c+d\,x]\right)+\frac{1}{2}\,a^2\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 1035: Result unnecessarily involves imaginary or complex numbers.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^4\,dx$$

Optimal (type 4, 407 leaves, 11 steps):

$$-\frac{\left(54\,a\,b\,B+3\,b^2\,(11\,A-16\,C)+8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{24\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+$$

$$\frac{\left(66\,a^2\,b\,B+48\,b^3\,B+8\,a^3\,(2\,A+3\,C)+a\,b^2\,(59\,A+96\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{24\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(5\,A\,b^3+8\,a^3\,B+30\,a\,b^2\,B+20\,a^2\,b\,(A+2\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{8\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(15\,A\,b^2+42\,a\,b\,B+8\,a^2\,(2\,A+3\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Tan}[c+d\,x]}{24\,d}+$$

$$\frac{(5\,A\,b+6\,a\,B)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{12\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,d}$$

Result (type 4, 684 leaves) :

$$\frac{1}{96\,d}\left(\frac{2\left(52\,a\,A\,b^2+24\,a^2\,b\,B+96\,b^3\,B+288\,a\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right.$$

$$2\left(104\,a^2\,A\,b-3\,A\,b^3+48\,a^3\,B+126\,a\,b^2\,B+216\,a^2\,b\,C+48\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\left(-16\,a^2\,A\,b-33\,A\,b^3-54\,a\,b^2\,B-24\,a^2\,b\,C+48\,b^3\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\left(\frac{1}{12}\,\mathrm{Sec}[c+d\,x]^2\,\left(13\,a\,A\,b\,\mathrm{Sin}[c+d\,x]+6\,a^2\,B\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\left.\frac{1}{24}\,\mathrm{Sec}[c+d\,x]\,\left(16\,a^2\,A\,\mathrm{Sin}[c+d\,x]+33\,A\,b^2\,\mathrm{Sin}[c+d\,x]+54\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+24\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{1}{3}\,a^2\,A\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Tan}[c+d\,x]\right)$$

## ■ Problem 1036: Result unnecessarily involves imaginary or complex numbers.

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^5\,dx$$

Optimal (type 4, 502 leaves, 12 steps) :

$$-\frac{\left(15\,A\,b^3+128\,a^3\,B+264\,a\,b^2\,B+4\,a^2\,b\,(71\,A+108\,C)\right)\sqrt{a+b\,Cos[c+d\,x]}\;EllipticE\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{192\,a\,d\,\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}}+\frac{1}{192\,d\,\sqrt{a+b\,Cos[c+d\,x]}}$$

$$\left(128\,a^3\,B+472\,a\,b^2\,B+4\,a^2\,b\,(89\,A+132\,C)+b^3\,(133\,A+384\,C)\right)\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticF\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]-\frac{1}{64\,a\,d\,\sqrt{a+b\,Cos[c+d\,x]}}$$

$$\left(5\,A\,b^4-160\,a^3\,b\,B-40\,a\,b^3\,B-120\,a^2\,b^2\,(A+2\,C)-16\,a^4\,(3\,A+4\,C)\right)\sqrt{\frac{a+b\,Cos[c+d\,x]}{a+b}}\;EllipticPi\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]+$$

$$\frac{\left(15\,A\,b^3+128\,a^3\,B+264\,a\,b^2\,B+4\,a^2\,b\,(71\,A+108\,C)\right)\sqrt{a+b\,Cos[c+d\,x]}\;Tan[c+d\,x]}{192\,a\,d}+$$

$$\frac{\left(5\,A\,b^2+24\,a\,b\,B+4\,a^2\,(3\,A+4\,C)\right)\sqrt{a+b\,Cos[c+d\,x]}\;Sec[c+d\,x]\;Tan[c+d\,x]}{32\,d}+$$

$$\frac{(5\,A\,b+8\,a\,B)\,(a+b\,Cos[c+d\,x])^{3/2}\,Sec[c+d\,x]^2\,Tan[c+d\,x]}{24\,d}+\frac{A\,(a+b\,Cos[c+d\,x])^{5/2}\,Sec[c+d\,x]^3\,Tan[c+d\,x]}{4\,d}$$

Result (type 4, 792 leaves) :

$$\frac{1}{768\,a\,d}\left(\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right.$$

$$2\left(144\,a^3\,A\,b+236\,a\,A\,b^3+416\,a^2\,b^2\,B+192\,a^3\,b\,C+768\,a\,b^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]+\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

$$2\left(288\,a^4\,A+436\,a^2\,A\,b^2-45\,A\,b^4+832\,a^3\,b\,B-24\,a\,b^3\,B+384\,a^4\,C+1008\,a^2\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(2\,\mathrm{i}\left(-284\,a^2\,A\,b^2-15\,A\,b^4-128\,a^3\,b\,B-264\,a\,b^3\,B-432\,a^2\,b^2\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{1}{24}\,\text{Sec}[c+d\,x]^3\left(17\,a\,A\,b\,\text{Sin}[c+d\,x]+8\,a^2\,B\,\text{Sin}[c+d\,x]\right)+\right.$$

$$\frac{1}{96}\,\text{Sec}[c+d\,x]^2\left(36\,a^2\,A\,\text{Sin}[c+d\,x]+59\,A\,b^2\,\text{Sin}[c+d\,x]+104\,a\,b\,B\,\text{Sin}[c+d\,x]+48\,a^2\,C\,\text{Sin}[c+d\,x]\right)+\frac{1}{192\,a}$$

$$\text{Sec}[c+d\,x]\left(284\,a^2\,A\,b\,\text{Sin}[c+d\,x]+15\,A\,b^3\,\text{Sin}[c+d\,x]+128\,a^3\,B\,\text{Sin}[c+d\,x]+264\,a\,b^2\,B\,\text{Sin}[c+d\,x]+432\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\left.\frac{1}{4}\,a^2\,A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 1037: Result unnecessarily involves imaginary or complex numbers.**

$$\int(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^6\,dx$$

Optimal (type 4, 624 leaves, 13 steps):

$$\frac{1}{1920\,a^2\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}$$

$$\left(45\,A\,b^4-2840\,a^3\,b\,B-150\,a\,b^3\,B-256\,a^4\,(4\,A+5\,C)-12\,a^2\,b^2\,(141\,A+220\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\left(\left(15\,A\,b^4-3560\,a^3\,b\,B-1330\,a\,b^3\,B-256\,a^4\,(4\,A+5\,C)-4\,a^2\,b^2\,(809\,A+1180\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]\right)\Big/$$

$$\left(1920\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$\left(\left(3\,A\,b^5+96\,a^5\,B+240\,a^3\,b^2\,B-10\,a\,b^4\,B+40\,a^2\,b^3\,(A+2\,C)+80\,a^4\,b\,(3\,A+4\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]\right)\Big/$$

$$\left(128\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-\frac{1}{1920\,a^2\,d}$$

$$\left(45\,A\,b^4-2840\,a^3\,b\,B-150\,a\,b^3\,B-256\,a^4\,(4\,A+5\,C)-12\,a^2\,b^2\,(141\,A+220\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Tan}[c+d\,x]+$$

$$\frac{\left(15\,A\,b^3+360\,a^3\,B+590\,a\,b^2\,B+4\,a^2\,b\,(193\,A+260\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{960\,a\,d}+$$

$$\frac{\left(15\,A\,b^2+110\,a\,b\,B+16\,a^2\,(4\,A+5\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{240\,d}+$$

$$\frac{(A\,b+2\,a\,B)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]}{8\,d}+\frac{A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]}{5\,d}$$

Result (type 4, 930 leaves) :

$$\frac{1}{7680\,a^2\,d}\left(\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}2\left(3088\,a^3\,A\,b^2+60\,a\,A\,b^4+1440\,a^4\,b\,B+2360\,a^2\,b^3\,B+4160\,a^3\,b^2\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]+\right.$$

$$\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}2\left(6176\,a^4\,A\,b-492\,a^2\,A\,b^3+135\,A\,b^5+2880\,a^5\,B+4360\,a^3\,b^2\,B-450\,a\,b^4\,B+8320\,a^4\,b\,C-240\,a^2\,b^3\,C\right)$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\left(-1024\,a^4\,A\,b-1692\,a^2\,A\,b^3+45\,A\,b^5-2840\,a^3\,b^2\,B-150\,a\,b^4\,B-1280\,a^4\,b\,C-2640\,a^2\,b^3\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\right.$$

$$\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2(c+d\,x)]\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\mathrm{EllipticF}\left[\right.\right.\right.$$

$$\left.\left.i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)$$

$$\left.\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(\frac{1}{40}\mathrm{Sec}[c+d\,x]^4\left(21\,a\,A\,b\,\mathrm{Sin}[c+d\,x]+10\,a^2\,B\,\mathrm{Sin}[c+d\,x]\right)+\right.$$

$$\frac{1}{240}\mathrm{Sec}[c+d\,x]^3\left(64\,a^2\,A\,\mathrm{Sin}[c+d\,x]+93\,A\,b^2\,\mathrm{Sin}[c+d\,x]+170\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+80\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{1}{960\,a}$$

$$\mathrm{Sec}[c+d\,x]^2\left(772\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]+15\,A\,b^3\,\mathrm{Sin}[c+d\,x]+360\,a^3\,B\,\mathrm{Sin}[c+d\,x]+590\,a\,b^2\,B\,\mathrm{Sin}[c+d\,x]+1040\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\frac{1}{1920\,a^2}\mathrm{Sec}[c+d\,x]\left(1024\,a^4\,A\,\mathrm{Sin}[c+d\,x]+1692\,a^2\,A\,b^2\,\mathrm{Sin}[c+d\,x]-45\,A\,b^4\,\mathrm{Sin}[c+d\,x]+2840\,a^3\,b\,B\,\mathrm{Sin}[c+d\,x]+\right.$$

$$\left.\left.150\,a\,b^3\,B\,\mathrm{Sin}[c+d\,x]+1280\,a^4\,C\,\mathrm{Sin}[c+d\,x]+2640\,a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{1}{5}a^2\,A\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 1043: Unable to integrate problem.**

$$\int \frac{\left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

Optimal (type 4, 189 leaves, 8 steps):

$$\frac{2 C \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{b d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}} + \frac{2 (b B - a C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{b d \sqrt{a + b \operatorname{Cos}[c + d x]}} + \frac{2 A \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{d \sqrt{a + b \operatorname{Cos}[c + d x]}}$$

Result (type 8, 43 leaves):

$$\int \frac{\left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

- **Problem 1044: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^2}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

Optimal (type 4, 220 leaves, 9 steps):

$$-\frac{A \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{a d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}} + \frac{(A + 2 C) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{d \sqrt{a + b \operatorname{Cos}[c + d x]}} - \frac{(A b - 2 a B) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{a d \sqrt{a + b \operatorname{Cos}[c + d x]}} + \frac{A \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{Tan}[c + d x]}{a d}$$

Result (type 4, 600 leaves):

$$\frac{2\,A\,\mathrm{Cos}[c+d\,x]\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)\mathrm{Sin}[c+d\,x]}{a\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}+$$

$$\frac{1}{2\,a\,d\,(2\,A+C+2\,B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[2\,c+2\,d\,x])}\mathrm{Cos}[c+d\,x]^2\left(C+B\,\mathrm{Sec}[c+d\,x]+A\,\mathrm{Sec}[c+d\,x]^2\right)$$

$$\left(\frac{8\,a\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{2\,(-3\,A\,b+4\,a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\mathrm{EllipticPi}\left[2,\frac{1}{2}(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\right.$$

$$\left(2\,i\,A\,b\,\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\,\mathrm{Cos}[2\,(c+d\,x)]\left(2\,a\,(a-b)\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+\right.\right.$$

$$b\left(2\,a\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.\left.b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,i\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\right)\right)$$

- **Problem 1045: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^3}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 303 leaves, 10 steps) :

$$\frac{(3 A b-4 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}-\frac{(A b-4 a B) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{\left(3 A b^2-4 a b B+4 a^2(A+2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{4 a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{(3 A b-4 a B) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Tan}[c+d x]}{4 a^2 d}+\frac{A \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 a d}$$

Result (type 4, 562 leaves) :

$$\frac{1}{16 a^2 d}\left(\frac{8 a A b \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2\left(8 a^2 A+9 A b^2-12 a b B+16 a^2 C\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{\sqrt{a+b \operatorname{Cos}[c+d x]}}-\right.$$

$$\left(2 i\left(3 A b^2-4 a b B\right) \sqrt{\frac{b-b \operatorname{Cos}[c+d x]}{a+b}} \sqrt{-\frac{b+b \operatorname{Cos}[c+d x]}{a-b}} \operatorname{Cos}[2(c+d x)]\right.$$

$$\left(2 a(a-b) \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]+b\left(2 a \operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b \operatorname{EllipticPi}\left[\frac{a+b}{a}, i \operatorname{ArcSinh}\left[\sqrt{-\frac{1}{a+b}} \sqrt{a+b \operatorname{Cos}[c+d x]}\right], \frac{a+b}{a-b}\right]\right)\right) \operatorname{Sin}[c+d x]\right) \Big/ \left(a \sqrt{-\frac{1}{a+b}} \sqrt{1-\operatorname{Cos}[c+d x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2 a(a+b \operatorname{Cos}[c+d x])+(a+b \operatorname{Cos}[c+d x])^2}{b^2}}\left(2 a^2-b^2-4 a(a+b \operatorname{Cos}[c+d x])+2(a+b \operatorname{Cos}[c+d x])^2\right)\right)\right)+$$

$$\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{\operatorname{Sec}[c+d x](-3 A b \operatorname{Sin}[c+d x]+4 a B \operatorname{Sin}[c+d x])}{4 a^2}+\frac{A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{2 a}\right)}{d}$$

## Problem 1046: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\left(A + B \operatorname{Cos}[c + d x] + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^4}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

Optimal (type 4, 405 leaves, 11 steps):

$$-\frac{\left(15 A b^2 - 18 a b B + 8 a^2 (2 A + 3 C)\right) \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{24 a^3 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}} +$$

$$\frac{\left(5 A b^2 - 6 a b B + 8 a^2 (2 A + 3 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{24 a^2 d \sqrt{a + b \operatorname{Cos}[c + d x]}} -$$

$$\frac{\left(5 A b^3 - 8 a^3 B - 6 a b^2 B + 4 a^2 b (A + 2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}} \operatorname{EllipticPi}\left[2, \frac{1}{2} (c + d x), \frac{2 b}{a+b}\right]}{8 a^3 d \sqrt{a + b \operatorname{Cos}[c + d x]}} +$$

$$\frac{\left(15 A b^2 - 18 a b B + 8 a^2 (2 A + 3 C)\right) \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{Tan}[c + d x]}{24 a^3 d} -$$

$$\frac{(5 A b - 6 a B) \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{Sec}[c + d x] \operatorname{Tan}[c + d x]}{12 a^2 d} + \frac{A \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{Sec}[c + d x]^2 \operatorname{Tan}[c + d x]}{3 a d}$$

Result (type 4, 665 leaves):

$$\frac{1}{96\,a^3\,d}\left(\frac{2\left(-20\,a\,A\,b^2+24\,a^2\,b\,B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\left(-40\,a^2\,A\,b-45\,A\,b^3+48\,a^3\,B+54\,a\,b^2\,B-72\,a^2\,b\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,\mathrm{i}\,\left(-16\,a^2\,A\,b-15\,A\,b^3+18\,a\,b^2\,B-24\,a^2\,b\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\;\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\;\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\;\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(\frac{\text{Sec}[c+d\,x]^2\,(-5\,A\,b\,\text{Sin}[c+d\,x]+6\,a\,B\,\text{Sin}[c+d\,x])}{12\,a^2}+\right.$$

$$\left.\frac{\text{Sec}[c+d\,x]\,\left(16\,a^2\,A\,\text{Sin}[c+d\,x]+15\,A\,b^2\,\text{Sin}[c+d\,x]-18\,a\,b\,B\,\text{Sin}[c+d\,x]+24\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{24\,a^3}+\frac{A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,a}\right)$$

- **Problem 1050: Unable to integrate problem.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 271 leaves, 9 steps) :

$$-\frac{2\left(A b^2-a\left(b B-a C\right)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\left(c+d\,x\right),\frac{2\,b}{a+b}\right]}{a\,b\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{2\,C\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\left(c+d\,x\right),\frac{2\,b}{a+b}\right]}{b\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,A\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}\left(c+d\,x\right),\frac{2\,b}{a+b}\right]}{a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{2\left(A b^2-a\left(b B-a C\right)\right)\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 43 leaves) :

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]}{\left(a+b\,\text{Cos}[c+d\,x]\right)^{3/2}}\,dx$$

## Problem 1051: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^2}{\left(a+b\,\text{Cos}[c+d\,x]\right)^{3/2}}\,dx$$

Optimal (type 4, 313 leaves, 10 steps) :

$$\frac{\left(3 A b^2-2 a b B-a^2\left(A-2 C\right)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\left(c+d\,x\right),\frac{2\,b}{a+b}\right]}{a^2\left(a^2-b^2\right)d\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}+\frac{A\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\left(c+d\,x\right),\frac{2\,b}{a+b}\right]}{a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{\left(3 A b-2 a B\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticPi}\left[2,\frac{1}{2}\left(c+d\,x\right),\frac{2\,b}{a+b}\right]}{a^2\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{b\left(3 A b^2-2 a b B-a^2\left(A-2 C\right)\right)\text{Sin}[c+d\,x]}{a^2\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{A\,\text{Tan}[c+d\,x]}{a\,d\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 751 leaves) :

$$\frac{1}{2\,a^2\,(a-b)\,(a+b)\,d\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])}$$

$$\text{Cos}[c+d\,x]^2\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\left(\frac{2\,\left(4\,a\,A\,b^2-4\,a^2\,b\,B+4\,a^3\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\right.$$

$$\frac{2\,\left(-7\,a^2\,A\,b+9\,A\,b^3+4\,a^3\,B-6\,a\,b^2\,B+2\,a^2\,b\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left(2\,i\,\left(-a^2\,A\,b+3\,A\,b^3-2\,a\,b^2\,B+2\,a^2\,b\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\,\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\,\text{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\right.\right.$$

$$\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]-\right.$$

$$\left.\left.b\,\text{EllipticPi}\left[\frac{a+b}{a},i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\Bigg)\Bigg/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\right.$$

$$\left.\left.\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\,\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\left(\text{Cos}[c+d\,x]^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\right.$$

$$\left.\left(-\frac{4\,\left(A\,b^3\,\text{Sin}[c+d\,x]-a\,b^2\,B\,\text{Sin}[c+d\,x]+a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{a^2\,\left(a^2-b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}+\frac{2\,A\,\text{Tan}[c+d\,x]}{a^2}\right)\right)\Bigg/$$

$$(d\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]))$$

- **Problem 1052: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 416 leaves, 11 steps):

$$-\frac{\left(15\,A\,b^3+4\,a^3\,B-12\,a\,b^2\,B-a^2\,(7\,A\,b-8\,b\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{4\,a^3\,\left(a^2-b^2\right)\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}}-$$

$$\frac{(5\,A\,b-4\,a\,B)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{4\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\left(15\,A\,b^2-12\,a\,b\,B+4\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{4\,a^3\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{b\,\left(15\,A\,b^3+4\,a^3\,B-12\,a\,b^2\,B-a^2\,(7\,A\,b-8\,b\,C)\right)\,\text{Sin}[c+d\,x]}{4\,a^3\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{(5\,A\,b-4\,a\,B)\,\text{Tan}[c+d\,x]}{4\,a^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 723 leaves) :

$$-\frac{1}{16\,a^3\,(-a+b)\,(a+b)\,d}\left(\frac{2\left(4\,a^3\,A\,b-20\,a\,A\,b^3+16\,a^2\,b^2\,B-16\,a^3\,b\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right.$$

$$2\left(8\,a^4\,A+29\,a^2\,A\,b^2-45\,A\,b^4-28\,a^3\,b\,B+36\,a\,b^3\,B+16\,a^4\,C-24\,a^2\,b^2\,C\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\;\text{EllipticPi}\left[2,\frac{1}{2}\,(c+d\,x),\frac{2\,b}{a+b}\right]-$$

$$\left(2\,i\left(7\,a^2\,A\,b^2-15\,A\,b^4-4\,a^3\,b\,B+12\,a\,b^3\,B-8\,a^2\,b^2\,C\right)\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\;\text{Cos}[2\,(c+d\,x)]\right.$$

$$\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]+b\left(2\,a\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\right.\right.\right.$$

$$\left.\left.\left.\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\frac{a+b}{a-b}\right]\right)\right)\text{Sin}[c+d\,x]\right)\Big/$$

$$\left(a\sqrt{-\frac{1}{a+b}}\sqrt{1-\text{Cos}[c+d\,x]^2}\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+\frac{1}{d}$$

$$\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{\text{Sec}[c+d\,x]\,(-7\,A\,b\,\text{Sin}[c+d\,x]+4\,a\,B\,\text{Sin}[c+d\,x])}{4\,a^3}+\frac{2\left(A\,b^4\,\text{Sin}[c+d\,x]-a\,b^3\,B\,\text{Sin}[c+d\,x]+a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])}+\right.$$

$$\left.\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a^2}\right)$$

- **Problem 1057: Unable to integrate problem.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 401 leaves, 10 steps):

$$\frac{2\left(3 A b^4+4 a^3 b B-a^4 C-a^2 b^2 (7 A+3 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a^2 b \left(a^2-b^2\right)^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}+$$

$$\frac{2\left(A b^2-a (b B-a C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\, \text{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a b \left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{2 A \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\, \text{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{a^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+$$

$$\frac{2\left(A b^2-a (b B-a C)\right) \operatorname{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d (a+b \operatorname{Cos}[c+d x])^{3/2}}-\frac{2\left(3 A b^4+4 a^3 b B-a^4 C-a^2 b^2 (7 A+3 C)\right) \operatorname{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

Result (type 8, 43 leaves) :

$$\int \frac{\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]}{(a+b \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

- **Problem 1058: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^2}{(a+b \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 461 leaves, 11 steps) :

$$\frac{\left(26 a^2 A b^2-15 A b^4-14 a^3 b B+6 a b^3 B-a^4 (3 A-8 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}}-$$

$$\frac{\left(5 A b^2-2 a b B-a^2 (3 A-2 C)\right) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\, \text{EllipticF}\left[\frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{3 a^2 \left(a^2-b^2\right) d \sqrt{a+b \operatorname{Cos}[c+d x]}}-\frac{(5 A b-2 a B) \sqrt{\frac{a+b \operatorname{Cos}[c+d x]}{a+b}}\, \text{EllipticPi}\left[2, \frac{1}{2}(c+d x), \frac{2 b}{a+b}\right]}{a^3 d \sqrt{a+b \operatorname{Cos}[c+d x]}}-$$

$$\frac{b\left(5 A b^2-2 a b B-a^2 (3 A-2 C)\right) \operatorname{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right) d (a+b \operatorname{Cos}[c+d x])^{3/2}}-\frac{b\left(26 a^2 A b^2-15 A b^4-14 a^3 b B+6 a b^3 B-a^4 (3 A-8 C)\right) \operatorname{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}+\frac{A \operatorname{Tan}[c+d x]}{a d (a+b \operatorname{Cos}[c+d x])^{3/2}}$$

Result (type 4, 915 leaves) :

$$\frac{1}{6\,a^3\,(-a+b)^2\,(a+b)^2\,d\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x])}\,\text{Cos}[c+d\,x]^2\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)$$

$$\left(\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}2\,\left(36\,a^3\,A\,b^2-20\,a\,A\,b^4-24\,a^4\,b\,B+8\,a^2\,b^3\,B+12\,a^5\,C+4\,a^3\,b^2\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]+\right.$$

$$\frac{1}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}2\,\left(-33\,a^4\,A\,b+86\,a^2\,A\,b^3-45\,A\,b^5+12\,a^5\,B-38\,a^3\,b^2\,B+18\,a\,b^4\,B+8\,a^4\,b\,C\right)\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}$$

$$\text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-\left(2\,i\,\left(-3\,a^4\,A\,b+26\,a^2\,A\,b^3-15\,A\,b^5-14\,a^3\,b^2\,B+6\,a\,b^4\,B+8\,a^4\,b\,C\right)\,\sqrt{\frac{b-b\,\text{Cos}[c+d\,x]}{a+b}}\right.$$

$$\sqrt{-\frac{b+b\,\text{Cos}[c+d\,x]}{a-b}}\,\text{Cos}[2\,(c+d\,x)]\,\left(2\,a\,(a-b)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\left(2\,a\,\text{EllipticF}\left[i\right.\right.\right.$$

$$\left.\left.\left.\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]-b\,\text{EllipticPi}\left[\frac{a+b}{a},\,i\,\text{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\right)\right)$$

$$\left.\text{Sin}[c+d\,x]\right)\Big/\left(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\text{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\text{Cos}[c+d\,x])+(a+b\,\text{Cos}[c+d\,x])^2}{b^2}}\right.$$

$$\left.\left.\left(2\,a^2-b^2-4\,a\,(a+b\,\text{Cos}[c+d\,x])+2\,(a+b\,\text{Cos}[c+d\,x])^2\right)\right)\right)+$$

$$\left(\text{Cos}[c+d\,x]^2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(C+B\,\text{Sec}[c+d\,x]+A\,\text{Sec}[c+d\,x]^2\right)\,\left(-\frac{4\,\left(A\,b^3\,\text{Sin}[c+d\,x]-a\,b^2\,B\,\text{Sin}[c+d\,x]+a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{3\,a^2\,\left(a^2-b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\right.\right.$$

$$\left(4\,\left(10\,a^2\,A\,b^3\,\text{Sin}[c+d\,x]-6\,A\,b^5\,\text{Sin}[c+d\,x]-7\,a^3\,b^2\,B\,\text{Sin}[c+d\,x]+3\,a\,b^4\,B\,\text{Sin}[c+d\,x]+4\,a^4\,b\,C\,\text{Sin}[c+d\,x]\right)\right)\Big/$$

$$\left.\left.\left(3\,a^3\,\left(a^2-b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])\right)+\frac{2\,A\,\text{Tan}[c+d\,x]}{a^3}\right)\right)\Big/\,(d\,(2\,A+C+2\,B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[2\,c+2\,d\,x]))$$

## Problem 1059: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^3}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 572 leaves, 12 steps):

$$\left(\left(105\,A\,b^5-12\,a^5\,B+104\,a^3\,b^2\,B-60\,a\,b^4\,B+a^4\,b\,(33\,A-56\,C)-2\,a^2\,b^3\,(85\,A-12\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]\right)\Big/$$

$$\left(12\,a^4\,\left(a^2-b^2\right)^2\,d\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\right)+\frac{\left(35\,A\,b^3+12\,a^3\,B-20\,a\,b^2\,B-a^2\,(27\,A\,b-8\,b\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{12\,a^3\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(35\,A\,b^2-20\,a\,b\,B+4\,a^2\,(A+2\,C)\right)\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{a+b}}\ \text{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]}{4\,a^4\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\,\left(35\,A\,b^3+12\,a^3\,B-20\,a\,b^2\,B-a^2\,(27\,A\,b-8\,b\,C)\right)\text{Sin}[c+d\,x]}{12\,a^3\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}-$$

$$\frac{b\,\left(105\,A\,b^5-12\,a^5\,B+104\,a^3\,b^2\,B-60\,a\,b^4\,B+a^4\,b\,(33\,A-56\,C)-2\,a^2\,b^3\,(85\,A-12\,C)\right)\text{Sin}[c+d\,x]}{12\,a^4\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{(7\,A\,b-4\,a\,B)\,\text{Tan}[c+d\,x]}{4\,a^2\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{2\,a\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}$$

Result (type 4, 922 leaves) :

$$\frac{1}{48\,a^4\,(a-b)^2\,(a+b)^2\,d}\Bigg(\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}$$

$$2\left(12\,a^5\,A\,b-216\,a^3\,A\,b^3+140\,a\,A\,b^5+144\,a^4\,b^2\,B-80\,a^2\,b^4\,B-96\,a^5\,b\,C+32\,a^3\,b^3\,C\right)\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]+$$

$$\frac{1}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}2\left(24\,a^6\,A+195\,a^4\,A\,b^2-566\,a^2\,A\,b^4+315\,A\,b^6-132\,a^5\,b\,B+344\,a^3\,b^3\,B-180\,a\,b^5\,B+48\,a^6\,C-152\,a^4\,b^2\,C+72\,a^2\,b^4\,C\right)$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{a+b}}\;\mathrm{EllipticPi}\left[2,\,\frac{1}{2}\,(c+d\,x),\,\frac{2\,b}{a+b}\right]-$$

$$\Bigg(2\,\mathbb{i}\,\left(33\,a^4\,A\,b^2-170\,a^2\,A\,b^4+105\,A\,b^6-12\,a^5\,b\,B+104\,a^3\,b^3\,B-60\,a\,b^5\,B-56\,a^4\,b^2\,C+24\,a^2\,b^4\,C\right)\sqrt{\frac{b-b\,\mathrm{Cos}[c+d\,x]}{a+b}}$$

$$\sqrt{-\frac{b+b\,\mathrm{Cos}[c+d\,x]}{a-b}}\;\mathrm{Cos}[2\,(c+d\,x)]\,\Bigg(2\,a\,(a-b)\,\mathrm{EllipticE}\left[\mathbb{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]+b\,\Bigg(2\,a\,\mathrm{EllipticF}\Bigg[$$

$$\mathbb{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\Bigg]-b\,\mathrm{EllipticPi}\left[\frac{a+b}{a},\,\mathbb{i}\,\mathrm{ArcSinh}\left[\sqrt{-\frac{1}{a+b}}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right],\,\frac{a+b}{a-b}\right]\Bigg)\Bigg)$$

$$\mathrm{Sin}[c+d\,x]\Bigg)\Bigg/\Bigg(a\,\sqrt{-\frac{1}{a+b}}\,\sqrt{1-\mathrm{Cos}[c+d\,x]^2}\,\sqrt{-\frac{a^2-b^2-2\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+(a+b\,\mathrm{Cos}[c+d\,x])^2}{b^2}}$$

$$\left(2\,a^2-b^2-4\,a\,(a+b\,\mathrm{Cos}[c+d\,x])+2\,(a+b\,\mathrm{Cos}[c+d\,x])^2\right)\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\Bigg(\frac{\mathrm{Sec}[c+d\,x]\,(-11\,A\,b\,\mathrm{Sin}[c+d\,x]+4\,a\,B\,\mathrm{Sin}[c+d\,x])}{4\,a^4}+\frac{2\left(A\,b^4\,\mathrm{Sin}[c+d\,x]-a\,b^3\,B\,\mathrm{Sin}[c+d\,x]+a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])^2}+$$

$$\left(2\left(13\,a^2\,A\,b^4\,\mathrm{Sin}[c+d\,x]-9\,A\,b^6\,\mathrm{Sin}[c+d\,x]-10\,a^3\,b^3\,B\,\mathrm{Sin}[c+d\,x]+6\,a\,b^5\,B\,\mathrm{Sin}[c+d\,x]+7\,a^4\,b^2\,C\,\mathrm{Sin}[c+d\,x]-3\,a^2\,b^4\,C\,\mathrm{Sin}[c+d\,x]\right)\right)\Big/$$

$$\left(3\,a^4\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])\right)+\frac{A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{2\,a^3}\Bigg)$$

- **Problem 1116: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{d}x$$

Optimal (type 4, 586 leaves, 8 steps):

$$-\frac{1}{24\,a\,b^2\,d}(a-b)\sqrt{a+b}\,\left(8\,b^2\,(3\,A+2\,C)+3\,a\,(2\,b\,B-a\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b^2\,d}\sqrt{a+b}\,\left(24\,A\,b^2+(a+2\,b)\,(6\,b\,B-3\,a\,C+8\,b\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{8\,b^3\,d}\sqrt{a+b}\,\left(2\,a^2\,b\,B-8\,b^3\,B-a^3\,C-4\,a\,b^2\,(2\,A+C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(8\,b^2\,(3\,A+2\,C)+3\,a\,(2\,b\,B-a\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{(2\,b\,B-a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1242 leaves):

$$\frac{1}{48\,b\,d}\left(-\left(4\,a\,\left(24\,A\,b^2+18\,a\,b\,B-a^2\,C+16\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(48\,a\,A\,b+24\,b^2\,B+28\,a\,b\,C\right)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(24\,A\,b^2+6\,a\,b\,B-3\,a^2\,C+16\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{(6\,b\,B+a\,C)\,\text{Sin}[c+d\,x]}{12\,b}+\frac{1}{6}\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

- **Problem 1117: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 483 leaves, 7 steps):

$$-\frac{1}{4\,a\,b\,d}(a-b)\sqrt{a+b}\,(4\,b\,B+a\,C)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} + \frac{1}{4\,b\,d}$$

$$\sqrt{a+b}\,(8\,A\,b+a\,C+2\,b\,(2\,B+C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} -$$

$$\frac{1}{4\,b^2\,d}\sqrt{a+b}\,\left(8\,A\,b^2+4\,a\,b\,B-a^2\,C+4\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} + \frac{(4\,b\,B+a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}} + \frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1183 leaves):

$$\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d} +$$

$$\frac{1}{8\,d}\left(-\left(4\,a\,(8\,a\,A+4\,b\,B+3\,a\,C)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,(8\,A\,b+8\,a\,B+4\,b\,C)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,(4\,b\,B+a\,C)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\mathrm{Csc}[c+d x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\mathrm{Cos}[c+d x]} \sqrt{a+b\,\mathrm{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\mathrm{Cos}[c+d x]} \sqrt{a+b\,\mathrm{Cos}[c+d x]}\right)\right) + \frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\mathrm{Sin}[c+d x]}{b \sqrt{\mathrm{Cos}[c+d x]}}\right)\right)$$

- **Problem 1118: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)}{\mathrm{Cos}[c+d x]^{3/2}}\,dx$$

Optimal (type 4, 449 leaves, 7 steps):

$$\frac{1}{a\,d}(a-b)\sqrt{a+b}\;(2A-C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{a\,d}$$

$$\sqrt{a+b}\;(2\,A\,b-a\,(2A-2B-C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{b\,d}\sqrt{a+b}\;(2\,b\,B+a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,A\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}-\frac{(2A-C)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1176 leaves) :

$$\frac{2\,A\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{d\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{1}{2\,d}\Bigg(-\Bigg(4\,a\,(2\,a\,B+b\,C)\sqrt{\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}(c+d\,x)\big]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\Bigg[\text{ArcSin}\Bigg[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Bigg],\,-\frac{2\,a}{-a+b}\Bigg]\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Bigg/$$

$$\Big((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)-4\,a\,(-2\,a\,A+2\,b\,B+2\,a\,C)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}(c+d\,x)\big]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\big[\frac{1}{2}(c+d\,x)\big]^2}{a}}\;\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\Bigg[\text{ArcSin}\Bigg[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Bigg],\,-\frac{2\,a}{-a+b}\Bigg]\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Bigg/\Big((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(-2\,A\,b+b\,C)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)$$

## Problem 1119: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\ \left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{\text{Cos}[c+d x]^{5/2}}\,dx$$

Optimal (type 4, 407 leaves, 6 steps):

$$\frac{1}{3 a^2 d}2\,(a-b)\,\sqrt{a+b}\,\,(A b+3 a B)\,\text{Cot}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-$$
$$\frac{1}{3 a d}2\sqrt{a+b}\,\,(b\,(A-3 B)-a\,(A-3 B+3 C))\,\text{Cot}[c+d x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{d}$$
$$2\sqrt{a+b}\,\,C\,\text{Cot}[c+d x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{2 A\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{3 d\,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1240 leaves):

$$\frac{1}{3 a d}$$
$$\left(-\left(4 a\left(a^2 A-A b^2+3 a^2 C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}\ \text{Csc}[\right.\right.$$
$$\left.c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}\,(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d x)\right]^4\right)\bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-a\,A\,b-3\,a^2\,B+3\,a\,b\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-A\,b^2-3\,a\,b\,B\right)\,\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2\,\text{Sec}[c+d\,x]\,(A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])}{3\,a}+\frac{2}{3}A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)}{d}$$

- **Problem 1120: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 360 leaves, 5 steps):

$$-\frac{1}{15\,a^3\,d}2\,(a-b)\sqrt{a+b}\,\left(2\,A\,b^2-5\,a\,b\,B-3\,a^2\,(3\,A+5\,C)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a^2\,d}$$

$$2\,(a-b)\sqrt{a+b}\,(2\,A\,b+a\,(9\,A-5\,B+15\,C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}+\frac{2\,(A\,b+5\,a\,B)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1340 leaves):

$$-\frac{1}{15 a^2 d}\left(-\left(\left(4 a \left(2 a^2 A b-2 A b^3-5 a^3 B+5 a b^2 B\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(9 a^3 A-2 a A b^2+5 a^2 b B+15 a^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+$$

$$2 \left(9 a^2 A b-2 A b^3+5 a b^2 B+15 a^2 b C\right) \left(\frac{i \operatorname{Cos}\left[\frac{1}{2} (c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \Bigg(\Bigg(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\Bigg) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\Bigg(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}$$

$$\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2} (c+d x)\right]^4\Bigg) \Big/$$

$$\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\Bigg) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\Bigg) +$$

$$\frac{1}{d}\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \Bigg(\frac{2 \operatorname{Sec}[c+d x]^2 (A b \operatorname{Sin}[c+d x] + 5 a B \operatorname{Sin}[c+d x])}{15 a} +$$

$$\frac{2 \operatorname{Sec}[c+d x] \left(9 a^2 A \operatorname{Sin}[c+d x] - 2 A b^2 \operatorname{Sin}[c+d x] + 5 a b B \operatorname{Sin}[c+d x] + 15 a^2 C \operatorname{Sin}[c+d x]\right)}{15 a^2} +$$

$$\frac{2}{5} A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Bigg)$$

- **Problem 1121: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 447 leaves, 6 steps) :

$$\frac{1}{105\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^3+63\,a^3\,B-14\,a\,b^2\,B+a^2\,b\,(19\,A+35\,C)\right)\,\mathrm{Cot}[c+d\,x]$$
$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^3\,d}$$
$$2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2+2\,a\,b\,(3\,A-7\,B)+a^2\,(25\,A-63\,B+35\,C)\right)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{7\,d\,\mathrm{Cos}[c+d\,x]^{7/2}}+$$
$$\frac{2\,(A\,b+7\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{35\,a\,d\,\mathrm{Cos}[c+d\,x]^{5/2}}-\frac{2\,\left(4\,A\,b^2-7\,a\,b\,B-5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{105\,a^2\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1464 leaves) :

$$\frac{1}{105\,a^3\,d}\left(-\left(4\,a\,\left(25\,a^4\,A-17\,a^2\,A\,b^2-8\,A\,b^4-14\,a^3\,b\,B+14\,a\,b^3\,B+35\,a^4\,C-35\,a^2\,b^2\,C\right)\right.\right.$$
$$\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$
$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$
$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-19\,a^3\,A\,b-8\,a\,A\,b^3-63\,a^4\,B+14\,a^2\,b^2\,B-35\,a^3\,b\,C\right)$$
$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+2\left(-19\,a^2\,A\,b^2-8\,A\,b^4-63\,a^3\,b\,B+14\,a\,b^3\,B-35\,a^2\,b^2\,C\right)$$

$$\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\text{Sec}[c+d\,x]^3\,(A\,b\,\text{Sin}[c+d\,x]+7\,a\,B\,\text{Sin}[c+d\,x])}{35\,a}+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]^2\,\left(25\,a^2\,A\,\text{Sin}[c+d\,x]-4\,A\,b^2\,\text{Sin}[c+d\,x]+7\,a\,b\,B\,\text{Sin}[c+d\,x]+35\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{105\,a^2}+$$

$$1\Big/\left(105\,a^3\right)2\,\text{Sec}[c+d\,x]$$

$$\left(19\,a^2\,A\,b\,\text{Sin}[c+d\,x]+8\,A\,b^3\,\text{Sin}[c+d\,x]+63\,a^3\,B\,\text{Sin}[c+d\,x]-14\,a\,b^2\,B\,\text{Sin}[c+d\,x]+35\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)+\frac{2}{7}$$

$$\left.A\,\text{Sec}[c+d\,x]^3\,\text{Tan}[c+d\,x]\right)$$

- **Problem 1122: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 704 leaves, 9 steps) :

$$-\frac{1}{192\,a\,b^2\,d}(a-b)\sqrt{a+b}\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{192\,b^2\,d}\sqrt{a+b}\left(9\,a^3\,C-6\,a^2\,b\,(4\,B+C)-8\,b^3\,(12\,A+16\,B+9\,C)-4\,a\,b^2\,(60\,A+28\,B+39\,C)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{64\,b^3\,d}\sqrt{a+b}\left(8\,a^3\,b\,B-96\,a\,b^3\,B-3\,a^4\,C-24\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(4\,b^2\,(4\,A+3\,C)+a\,(8\,b\,B-3\,a\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,b\,d}+$$

$$\frac{(8\,b\,B-3\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,b\,d}+\frac{C\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1317 leaves) :

$$-\frac{1}{384\,b\,d}\left(\left(-4\,a\left(-336\,a\,A\,b^2-136\,a^2\,b\,B-128\,b^3\,B+3\,a^3\,C-228\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-384\,a^2\,A\,b-192\,A\,b^3-416\,a\,b^2\,B-228\,a^2\,b\,C-144\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-240\,a\,A\,b^2-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-156\,a\,b^2\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{\left(48\,A\,b^2+56\,a\,b\,B+3\,a^2\,C+42\,b^2\,C\right)\text{Sin}[c+d\,x]}{96\,b}+\right.$$

$$\left.\frac{1}{48}(8\,b\,B+9\,a\,C)\,\text{Sin}[2(c+d\,x)]+\frac{1}{16}\,b\,C\,\text{Sin}[3(c+d\,x)]\right)$$

## Problem 1123: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 587 leaves, 8 steps):

$$-\frac{1}{24\,a\,b\,d}(a-b)\sqrt{a+b}\left(24\,A\,b^2+30\,a\,b\,B+3\,a^2\,C+16\,b^2\,C\right)\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b\,d}\sqrt{a+b}\,\left(3\,a^2\,C+4\,b^2\,(6\,A+3\,B+4\,C)+2\,a\,b\,(24\,A+15\,B+7\,C)\right)$$

$$\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^2\,d}$$

$$\sqrt{a+b}\,\left(6\,a^2\,b\,B+8\,b^3\,B-a^3\,C+12\,a\,b^2\,(2\,A+C)\right)\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{\left(24\,A\,b^2+30\,a\,b\,B+3\,a^2\,C+16\,b^2\,C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+$$

$$\frac{(2\,b\,B+a\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d}+\frac{C\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1250 leaves) :

$$\frac{1}{48\,d}\left(-\left(\left(4\,a\left(48\,a^2\,A+24\,A\,b^2+42\,a\,b\,B+17\,a^2\,C+16\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(96\,a\,A\,b+48\,a^2\,B+24\,b^2\,B+52\,a\,b\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(24\,A\,b^2+30\,a\,b\,B+3\,a^2\,C+16\,b^2\,C\right)\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b}, \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg) +$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg) + \frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{12}\,(6\,b\,B+7\,a\,C)\,\text{Sin}[c+d\,x]+\frac{1}{6}\,b\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}$$

## ■ Problem 1124: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 535 leaves, 8 steps):

$$\frac{1}{4\,a\,d}(a-b)\,\sqrt{a+b}\,(8\,a\,A-4\,b\,B-5\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{4\,d}\sqrt{a+b}\,(a\,(8\,A-8\,B-5\,C)-2\,b\,(8\,A+2\,B+C))\,\text{Cot}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{1}{4\,b\,d}$$
$$\sqrt{a+b}\,\left(8\,A\,b^2+12\,a\,b\,B+3\,a^2\,C+4\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right], -\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}} - \frac{(8\,a\,A-4\,b\,B-5\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Cos}[c+d\,x]}} -$$
$$\frac{b\,(4\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d} + \frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1232 leaves):

$$\frac{1}{8\,d}\Bigg(\Bigg(4\,a\,\left(-8\,a\,A\,b-8\,a^2\,B-4\,b^2\,B-7\,a\,b\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+4\,a\,\left(8\,a^2\,A-8\,A\,b^2-16\,a\,b\,B-8\,a^2\,C-4\,b^2\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)-$$

$$2\,\left(8\,a\,A\,b-4\,b^2\,B-5\,a\,b\,C\right)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.$$

$$\left.\left.\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right) +$$

$$\left.\left.\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right) + \frac{\sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{1}{2} b C \operatorname{Sin}[c+d x] + 2 a A \operatorname{Tan}[c+d x]\right)}{d}$$

- **Problem 1125: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b \operatorname{Cos}[c+d x])^{3/2} \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right)}{\operatorname{Cos}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 528 leaves, 8 steps) :

$$\frac{1}{3\,a\,d}(a-b)\sqrt{a+b}\,(8\,A\,b+6\,a\,B-3\,b\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a\,d}\sqrt{a+b}\,\left(6\,A\,b^2+2\,a^2\,(A-3\,B+3\,C)-a\,b\,(8\,A-3\,(4\,B+C))\right)$$

$$\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$

$$\sqrt{a+b}\,(2\,b\,B+3\,a\,C)\,\mathrm{Cot}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,(A\,b+a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\,\sqrt{\mathrm{Cos}[c+d\,x]}}-\frac{(8\,A\,b+6\,a\,B-3\,b\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{\mathrm{Cos}[c+d\,x]}}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\mathrm{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1260 leaves) :

$$\frac{1}{6\,d}\left(-\left(4\,a\,\left(2\,a^2\,A-2\,A\,b^2+6\,a\,b\,B+6\,a^2\,C+3\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(-8\,a\,A\,b-6\,a^2\,B+6\,b^2\,B+12\,a\,b\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-8\,A\,b^2-6\,a\,b\,B+3\,b^2\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\ \left(\frac{2}{3}\,\text{Sec}[c+d\,x]\ (4\,A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])+\frac{2}{3}\,a\,A\,\text{Sec}[c+d\,x]\ \text{Tan}[c+d\,x]\right)$$

- **Problem 1126: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 490 leaves, 7 steps):

$$\frac{1}{15\,a^2\,d}2\,(a-b)\sqrt{a+b}\,\left(3\,A\,b^2+20\,a\,b\,B+3\,a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a\,d}2\sqrt{a+b}\,\left(3\,b^2\,(A-5\,B)-2\,a\,b\,(6\,A-10\,B+15\,C)+a^2\,(9\,A-5\,B+15\,C)\right)$$
$$\text{Cot}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$
$$2\,b\sqrt{a+b}\ C\,\text{Cot}[c+d\,x]\ \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,(3\,A\,b+5\,a\,B)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{15\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}$$

Result (type 4, 1353 leaves):

$$-\frac{1}{15\,a\,d}\left(\left(-\left(4\,a\left(-3\,a^2\,A\,b+3\,A\,b^3-5\,a^3\,B+5\,a\,b^2\,B-15\,a^2\,b\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\ \text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\ \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(9\,a^3\,A+3\,a\,A\,b^2+20\,a^2\,b\,B+15\,a^3\,C-15\,a\,b^2\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\ \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\ \text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(9\,a^2\,A\,b+3\,A\,b^3+20\,a\,b^2\,B+15\,a^2\,b\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\Bigg(\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{2}{15}\text{Sec}[c+d\,x]^2\,(6\,A\,b\,\text{Sin}[c+d\,x]+5\,a\,B\,\text{Sin}[c+d\,x])+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]\left(9\,a^2\,A\,\text{Sin}[c+d\,x]+3\,A\,b^2\,\text{Sin}[c+d\,x]+20\,a\,b\,B\,\text{Sin}[c+d\,x]+15\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{15\,a}+$$

$$\left.\frac{2}{5}\,a\,A\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)$$

- **Problem 1127: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{9/2}}\,dx$$

Optimal (type 4, 450 leaves, 6 steps):

$$-\frac{1}{105 a^3 d}2 (a-b) \sqrt{a+b} \left(6 A b^3-63 a^3 B-21 a b^2 B-2 a^2 b (41 A+70 C)\right) \text{Cot}[c+d x] \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{105 a^2 d}2 (a-b) \sqrt{a+b} \left(6 A b^2-a^2 (25 A-63 B+35 C)+3 a b (19 A-7 B+35 C)\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 (3 A b+7 a B) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{35 d \text{Cos}[c+d x]^{5/2}}+\frac{2 \left(3 A b^2+42 a b B+5 a^2 (5 A+7 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{Sin}[c+d x]}{105 a d \text{Cos}[c+d x]^{3/2}}+\frac{2 A (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{7 d \text{Cos}[c+d x]^{7/2}}$$

Result (type 4, 1463 leaves) :

$$\frac{1}{105 a^2 d}\left(-\left(4 a \left(25 a^4 A-31 a^2 A b^2+6 A b^4+21 a^3 b B-21 a b^3 B+35 a^4 C-35 a^2 b^2 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(-82 a^3 A b+6 a A b^3-63 a^4 B-21 a^2 b^2 B-140 a^3 b C\right) \left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-82\,a^2\,A\,b^2+6\,A\,b^4-63\,a^3\,b\,B-21\,a\,b^3\,B-140\,a^2\,b^2\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{2}{35}\,\mathrm{Sec}[c+d\,x]^3\,(8\,A\,b\,\mathrm{Sin}[c+d\,x]+7\,a\,B\,\mathrm{Sin}[c+d\,x])+\right.$$

$$\frac{2\,\mathrm{Sec}[c+d\,x]^2\left(25\,a^2\,A\,\mathrm{Sin}[c+d\,x]+3\,A\,b^2\,\mathrm{Sin}[c+d\,x]+42\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+35\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{105\,a}+$$

$$1\Big/\left(105\,a^2\right)2\,\mathrm{Sec}[c+d\,x]$$

$$\left(82\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]-6\,A\,b^3\,\mathrm{Sin}[c+d\,x]+63\,a^3\,B\,\mathrm{Sin}[c+d\,x]+21\,a\,b^2\,B\,\mathrm{Sin}[c+d\,x]+140\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{2}{7}$$

$$\left.a\,A\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]\right)$$

- **Problem 1128: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Cos}[c+d\,x]^{11/2}}\,dx$$

Optimal (type 4, 550 leaves, 7 steps) :

$$\frac{1}{315 a^4 d} 2 (a-b) \sqrt{a+b} \left(8 A b^4 + 246 a^3 b B - 18 a b^3 B + 21 a^4 (7 A + 9 C) + 3 a^2 b^2 (11 A + 21 C)\right)$$

$$\text{Cot}[c+d x] \text{ EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{1}{315 a^3 d} 2 (a-b) \sqrt{a+b} \left(8 A b^3 + 6 a b^2 (A - 3 B) + 3 a^2 b (13 A - 57 B + 21 C) - 3 a^3 (49 A - 25 B + 63 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 (A b + 3 a B) \sqrt{a+b \text{Cos}[c+d x]} \text{ Sin}[c+d x]}{21 d \text{Cos}[c+d x]^{7/2}} + \frac{2 \left(3 A b^2 + 72 a b B + 7 a^2 (7 A + 9 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{ Sin}[c+d x]}{315 a d \text{Cos}[c+d x]^{5/2}} -$$

$$\frac{2 \left(4 A b^3 - 75 a^3 B - 9 a b^2 B - 2 a^2 b (44 A + 63 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{ Sin}[c+d x]}{315 a^2 d \text{Cos}[c+d x]^{3/2}} + \frac{2 A (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{9 d \text{Cos}[c+d x]^{9/2}}$$

Result (type 4, 1614 leaves) :

$$-\frac{1}{315 a^3 d} \left( \left( - 4 a \left(-39 a^4 A b + 31 a^2 A b^3 + 8 A b^5 - 75 a^5 B + 93 a^3 b^2 B - 18 a b^4 B - 63 a^4 b C + 63 a^2 b^3 C\right) \right.\right.$$

$$\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right) -$$

$$4 a \left(147 a^5 A + 33 a^3 A b^2 + 8 a A b^4 + 246 a^4 b B - 18 a^2 b^3 B + 189 a^5 C + 63 a^3 b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(147\,a^4\,A\,b+33\,a^2\,A\,b^3+8\,A\,b^5+246\,a^3\,b^2\,B-18\,a\,b^4\,B+189\,a^4\,b\,C+63\,a^2\,b^3\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2}{63}\,\text{Sec}[c+d\,x]^4\,(10\,A\,b\,\text{Sin}[c+d\,x]+9\,a\,B\,\text{Sin}[c+d\,x])+\right.$$

$$\frac{2\,\text{Sec}[c+d\,x]^3\,\left(49\,a^2\,A\,\text{Sin}[c+d\,x]+3\,A\,b^2\,\text{Sin}[c+d\,x]+72\,a\,b\,B\,\text{Sin}[c+d\,x]+63\,a^2\,C\,\text{Sin}[c+d\,x]\right)}{315\,a}+$$

$$\frac{1}{315\,a^2}$$

$$2\,\text{Sec}[c+d\,x]^2\,\left(88\,a^2\,A\,b\,\text{Sin}[c+d\,x]-4\,A\,b^3\,\text{Sin}[c+d\,x]+75\,a^3\,B\,\text{Sin}[c+d\,x]+9\,a\,b^2\,B\,\text{Sin}[c+d\,x]+126\,a^2\,b\,C\,\text{Sin}[c+d\,x]\right)+$$

$$\frac{1}{315\,a^3}$$

$$2\,\text{Sec}[c+d\,x]\,\left(147\,a^4\,A\,\text{Sin}[c+d\,x]+33\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]+8\,A\,b^4\,\text{Sin}[c+d\,x]+246\,a^3\,b\,B\,\text{Sin}[c+d\,x]-\right.$$

$$\left.\left.18\,a\,b^3\,B\,\text{Sin}[c+d\,x]+189\,a^4\,C\,\text{Sin}[c+d\,x]+63\,a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)+\frac{2}{9}\,a\,A\,\text{Sec}[c+d\,x]^4\,\text{Tan}[c+d\,x]\right)$$

- **Problem 1129: Result unnecessarily involves imaginary or complex numbers.**

$$\int\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,dx$$

Optimal (type 4, 834 leaves, 10 steps) :

$$-\frac{1}{1920\,a\,b^2\,d}(a-b)\sqrt{a+b}\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+256\,b^4\,(5\,A+4\,C)+12\,a^2\,b^2\,(220\,A+141\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{1920\,b^2\,d}$$

$$\sqrt{a+b}\left(45\,a^4\,C-30\,a^3\,b\,(5\,B+C)-16\,b^4\,(80\,A+45\,B+64\,C)-8\,a\,b^3\,(260\,A+355\,B+193\,C)-4\,a^2\,b^2\,(660\,A+295\,B+423\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{128\,b^3\,d}\sqrt{a+b}\left(10\,a^4\,b\,B-240\,a^2\,b^3\,B-96\,b^5\,B-3\,a^5\,C-40\,a^3\,b^2\,(2\,A+C)-80\,a\,b^4\,(4\,A+3\,C)\right)\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{1920\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+256\,b^4\,(5\,A+4\,C)+12\,a^2\,b^2\,(220\,A+141\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]+$$

$$\frac{\left(50\,a^2\,b\,B+120\,b^3\,B-15\,a^3\,C+4\,a\,b^2\,(60\,A+43\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{320\,b\,d}+$$

$$\frac{\left(80\,A\,b^2+50\,a\,b\,B-15\,a^2\,C+64\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{240\,b\,d}+$$

$$\frac{(10\,b\,B-3\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{40\,b\,d}+\frac{C\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{7/2}\,\text{Sin}[c+d\,x]}{5\,b\,d}$$

Result (type 4, 1410 leaves) :

$$-\frac{1}{3840\,b\,d}\left(-\left(4\,a\left(-4720\,a^2\,A\,b^2-1280\,A\,b^4-1330\,a^3\,b\,B-3560\,a\,b^3\,B+15\,a^4\,C-3236\,a^2\,b^2\,C-1024\,b^4\,C\right)\right.\right.$$

$$\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\left(-3840\,a^3\,A\,b-6080\,a\,A\,b^3-6440\,a^2\,b^2\,B-1440\,b^4\,B-2292\,a^3\,b\,C-4624\,a\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(-2640\,a^2\,A\,b^2-1280\,A\,b^4-150\,a^3\,b\,B-2840\,a\,b^3\,B+45\,a^4\,C-1692\,a^2\,b^2\,C-1024\,b^4\,C\right)$$

$$\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{\left(1040\,a\,A\,b^2+590\,a^2\,b\,B+420\,b^3\,B+15\,a^3\,C+898\,a\,b^2\,C\right)\text{Sin}[c+d\,x]}{960\,b}+\right.$$

$$\frac{1}{480}\left(80\,A\,b^2+170\,a\,b\,B+93\,a^2\,C+88\,b^2\,C\right)\text{Sin}[2\,(c+d\,x)]+\frac{1}{160}\,b\,(10\,b\,B+21\,a\,C)\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{40}\left.b^2\,C\,\text{Sin}[4\,(c+d\,x)]\right)$$

- **Problem 1130: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 700 leaves, 9 steps) :

$$-\frac{1}{192\,a\,b\,d}(a-b)\sqrt{a+b}\,\left(264\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(108\,A+71\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{192\,b\,d}\sqrt{a+b}\,\left(15\,a^3\,C+8\,b^3\,(12\,A+16\,B+9\,C)+2\,a^2\,b\,(192\,A+132\,B+59\,C)+4\,a\,b^2\,(108\,A+52\,B+71\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{64\,b^2\,d}\sqrt{a+b}\,\left(40\,a^3\,b\,B+160\,a\,b^3\,B-5\,a^4\,C+120\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(264\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(108\,A+71\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$

$$\frac{\left(16\,A\,b^2+24\,a\,b\,B+5\,a^2\,C+12\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,d}+$$

$$\frac{(8\,b\,B+5\,a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,d}$$

Result (type 4, 1326 leaves) :

$$\frac{1}{384\,d}$$

$$\left(\left(-4\,a\,\left(384\,a^3\,A+528\,a\,A\,b^2+472\,a^2\,b\,B+128\,b^3\,B+133\,a^3\,C+356\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(1152\,a^2\,A\,b+192\,A\,b^3+384\,a^3\,B+608\,a\,b^2\,B+644\,a^2\,b\,C+144\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+2\,\left(432\,a\,A\,b^2+264\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+284\,a\,b^2\,C\right)$$

$$\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{1}{96}\left(48\,A\,b^2+104\,a\,b\,B+59\,a^2\,C+42\,b^2\,C\right)\text{Sin}[c+d\,x]+\frac{1}{48}\,b\,(8\,b\,B+17\,a\,C)\right.$$

$$\left.\text{Sin}[2\,(c+d\,x)]+\frac{1}{16}\,b^2\,C\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 1131: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 647 leaves, 9 steps) :

$$-\frac{1}{24\,a\,d}(a-b)\sqrt{a+b}\left(54\,a\,b\,B-a^2\,(48\,A-33\,C)+8\,b^2\,(3\,A+2\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{24\,d}\sqrt{a+b}\left(a^2\,(48\,A-48\,B-33\,C)-4\,b^2\,(6\,A+3\,B+4\,C)-2\,a\,b\,(72\,A+27\,B+13\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d}$$

$$\sqrt{a+b}\,\left(30\,a^2\,b\,B+8\,b^3\,B+5\,a^3\,C+20\,a\,b^2\,(2\,A+C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(54\,a\,b\,B-a^2\,(48\,A-33\,C)+8\,b^2\,(3\,A+2\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$

$$\frac{b\,(8\,a\,A-2\,b\,B-3\,a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d}-$$

$$\frac{b\,(6\,A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1302 leaves) :

$$\frac{1}{48\,d}\left(\left(4\,a\,\left(-96\,a^2\,A\,b-24\,A\,b^3-48\,a^3\,B-66\,a\,b^2\,B-59\,a^2\,b\,C-16\,b^3\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a\,\left(48\,a^3\,A-144\,a\,A\,b^2-144\,a^2\,b\,B-24\,b^3\,B-48\,a^3\,C-76\,a\,b^2\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)-2\,\left(48\,a^2\,A\,b-24\,A\,b^3-54\,a\,b^2\,B-33\,a^2\,b\,C-16\,b^3\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{12}\,b\,(6\,b\,B+13\,a\,C)\,\text{Sin}[c+d\,x]+\frac{1}{6}\,b^2\,C\,\text{Sin}[2\,(c+d\,x)]+\right.$$

$$\left.2\,a^2\,A\,\text{Tan}[c+d\,x]\right)$$

- **Problem 1132: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 622 leaves, 9 steps) :

$$\frac{1}{12\,a\,d}(a-b)\sqrt{a+b}\left(24 a^2 B-12 b^2 B+a b (56 A-27 C)\right) \text{Cot}[c+d x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{12 d}$$
$$\sqrt{a+b}\left(a b (56 A-72 B-27 C)-6 b^2 (12 A+2 B+C)-8 a^2 (A-3 B+3 C)\right) \text{Cot}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{4 d}\sqrt{a+b}\left(8 A b^2+20 a b B+15 a^2 C+4 b^2 C\right) \text{Cot}[c+d x]$$
$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}-$$
$$\frac{\left(24 a^2 B-12 b^2 B+a b (56 A-27 C)\right)\sqrt{a+b \text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{12 d\sqrt{\text{Cos}[c+d x]}}-\frac{b (8 A b+4 a B-b C)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b \text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{2 d}+$$
$$\frac{2 (5 A b+3 a B)(a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{3 d\sqrt{\text{Cos}[c+d x]}}+\frac{2 A (a+b \text{Cos}[c+d x])^{5/2} \text{Sin}[c+d x]}{3 d \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1316 leaves) :

$$\frac{1}{24 d}\left(-\left(4 a \left(8 a^3 A+16 a A b^2+48 a^2 b B+12 b^3 B+24 a^3 C+33 a b^2 C\right)\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$
$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\text{Csc}[c+d x] \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$
$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(-56 a^2 A b+24 A b^3-24 a^3 B+72 a b^2 B+72 a^2 b C+12 b^3 C\right)$$
$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(-56\,a\,A\,b^2-24\,a^2\,b\,B+12\,b^3\,B+27\,a\,b^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{1}{2}\,b^2\,C\,\text{Sin}[c+d\,x]+\frac{2}{3}\,\text{Sec}[c+d\,x]\,\left(7\,a\,A\,b\,\text{Sin}[c+d\,x]+3\,a^2\,B\,\text{Sin}[c+d\,x]\right)+\right.$$
$$\left.\frac{2}{3}\,a^2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]\right)$$

- **Problem 1133: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Cos}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 643 leaves, 9 steps):

$$\frac{1}{15\,a\,d}(a-b)\,\sqrt{a+b}\,\left(70\,a\,b\,B+b^2\,(46\,A-15\,C)+6\,a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{15\,a\,d}\sqrt{a+b}\,\left(30\,A\,b^3-2\,a^3\,(9\,A-5\,B+15\,C)+2\,a^2\,b\,(17\,A-35\,B+45\,C)-a\,b^2\,(46\,A-15\,(6\,B+C))\right)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{d}$$
$$b\,\sqrt{a+b}\,(2\,b\,B+5\,a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{2\,\left(5\,A\,b^2+10\,a\,b\,B+a^2\,(3\,A+5\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Cos}[c+d\,x]}}-\frac{\left(70\,a\,b\,B+b^2\,(46\,A-15\,C)+6\,a^2\,(3\,A+5\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,(A\,b+a\,B)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\text{Cos}[c+d\,x]^{3/2}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Cos}[c+d\,x]^{5/2}}$$

Result (type 4, 1370 leaves) :

$$\frac{1}{30\,d}\Bigg(\Bigg(4\,a\,\left(-16\,a^2\,A\,b+16\,A\,b^3-10\,a^3\,B-20\,a\,b^2\,B-60\,a^2\,b\,C-15\,b^3\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+4\,a\,\left(18\,a^3\,A+46\,a\,A\,b^2+70\,a^2\,b\,B-30\,b^3\,B+30\,a^3\,C-90\,a\,b^2\,C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)-2\,\left(18\,a^2\,A\,b+46\,A\,b^3+70\,a\,b^2\,B+30\,a^2\,b\,C-15\,b^3\,C\right)$$

$$\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a\left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)+$$

$$\frac{1}{d} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\left(\frac{2}{15} \operatorname{Sec}[c+d x]^2\left(11 a A b \operatorname{Sin}[c+d x]+5 a^2 B \operatorname{Sin}[c+d x]\right)+\right.$$

$$\frac{2}{15} \operatorname{Sec}[c+d x]$$

$$\left(9 a^2 A \operatorname{Sin}[c+d x]+23 A b^2 \operatorname{Sin}[c+d x]+35 a b B \operatorname{Sin}[c+d x]+15 a^2 C \operatorname{Sin}[c+d x]\right)+\frac{2}{5}$$

$$a^2 A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]\Big)$$

- **Problem 1134: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{(a+b \operatorname{Cos}[c+d x])^{5/2} \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right)}{\operatorname{Cos}[c+d x]^{9/2}}\, dx$$

Optimal (type 4, 580 leaves, 8 steps):

$$\frac{1}{105 a^2 d} 2 (a-b) \sqrt{a+b} \left(15 A b^3+63 a^3 B+161 a b^2 B+5 a^2 b (29 A+49 C)\right) \operatorname{Cot}[c+d x]$$
$$\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} - \frac{1}{105 a d}$$
$$2 \sqrt{a+b} \left(15 b^3 (A-7 B)-a^3 (25 A-63 B+35 C)+a^2 b (145 A-119 B+245 C)-a b^2 (135 A-161 B+315 C)\right) \operatorname{Cot}[c+d x]$$
$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} - \frac{1}{d}$$
$$2 b^2 \sqrt{a+b}\, C \operatorname{Cot}[c+d x] \operatorname{EllipticPi}\left[\frac{a+b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}} +$$
$$\frac{2 \left(15 A b^2+56 a b B+5 a^2 (5 A+7 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{105 d \operatorname{Cos}[c+d x]^{3/2}} +$$
$$\frac{2 (5 A b+7 a B) (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sin}[c+d x]}{35 d \operatorname{Cos}[c+d x]^{5/2}} + \frac{2 A (a+b \operatorname{Cos}[c+d x])^{5/2} \operatorname{Sin}[c+d x]}{7 d \operatorname{Cos}[c+d x]^{7/2}}$$

Result (type 4, 1472 leaves):

$$\frac{1}{105 a d} \Bigg( - \Bigg( 4 a \left(25 a^4 A-10 a^2 A b^2-15 A b^4+56 a^3 b B-56 a b^3 B+35 a^4 C+70 a^2 b^2 C\right)$$
$$\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}$$

$$\left.\text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(-145 a^3 A b-15 a A b^3-63 a^4 B-161 a^2 b^2 B-245 a^3 b C+105 a b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x]\ \text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d x]}\ \sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+2\left(-145 a^2 A b^2-15 A b^4-63 a^3 b B-161 a b^3 B-245 a^2 b^2 C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\,\text{Cos}[c+d x]}\ \text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\text{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right]\text{Sec}[c+d x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\text{Sec}[c+d x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\text{Csc}[c+dx]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+dx]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{b\sqrt{\text{Cos}[c+dx]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\left(\frac{2}{35}\text{Sec}[c+dx]^3\left(15\,a\,A\,b\,\text{Sin}[c+dx]+7\,a^2\,B\,\text{Sin}[c+dx]\right)+\right.$$

$$\frac{2}{105}\text{Sec}[c+dx]^2\left(25\,a^2\,A\,\text{Sin}[c+dx]+45\,A\,b^2\,\text{Sin}[c+dx]+77\,a\,b\,B\,\text{Sin}[c+dx]+35\,a^2\,C\,\text{Sin}[c+dx]\right)+\frac{1}{105\,a}$$

$$2\,\text{Sec}[c+dx]\left(145\,a^2\,A\,b\,\text{Sin}[c+dx]+15\,A\,b^3\,\text{Sin}[c+dx]+63\,a^3\,B\,\text{Sin}[c+dx]+161\,a\,b^2\,B\,\text{Sin}[c+dx]+245\,a^2\,b\,C\,\text{Sin}[c+dx]\right)+$$

$$\left.\frac{2}{7}a^2\,A\,\text{Sec}[c+dx]^3\,\text{Tan}[c+dx]\right)$$

- **Problem 1135: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+dx])^{5/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\text{Cos}[c+dx]^{11/2}}\,dx$$

Optimal (type 4, 552 leaves, 7 steps) :

$$-\frac{1}{315\,a^3\,d}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^4-435\,a^3\,b\,B-45\,a\,b^3\,B-21\,a^4\,(7\,A+9\,C)-3\,a^2\,b^2\,(93\,A+161\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{315\,a^2\,d}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^3+15\,a\,b^2\,(11\,A-3\,B+21\,C)-6\,a^2\,b\,(19\,A-60\,B+28\,C)+3\,a^3\,(49\,A-25\,B+63\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,\left(15\,A\,b^2+90\,a\,b\,B+7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,d\,\text{Cos}[c+d\,x]^{5/2}}+$$

$$\frac{2\,\left(5\,A\,b^3+75\,a^3\,B+135\,a\,b^2\,B+a^2\,b\,(163\,A+231\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}+$$

$$\frac{2\,(5\,A\,b+9\,a\,B)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{63\,d\,\text{Cos}[c+d\,x]^{7/2}}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{9\,d\,\text{Cos}[c+d\,x]^{9/2}}$$

Result (type 4, 1616 leaves) :

$$-\frac{1}{315\,a^2\,d}\left(-\left(4\,a\,\left(-114\,a^4\,A\,b+124\,a^2\,A\,b^3-10\,A\,b^5-75\,a^5\,B+30\,a^3\,b^2\,B+45\,a\,b^4\,B-168\,a^4\,b\,C+168\,a^2\,b^3\,C\right)\right.\right.$$

$$\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$4\,a\,\left(147\,a^5\,A+279\,a^3\,A\,b^2-10\,a\,A\,b^4+435\,a^4\,b\,B+45\,a^2\,b^3\,B+189\,a^5\,C+483\,a^3\,b^2\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(147\,a^4\,A\,b+279\,a^2\,A\,b^3-10\,A\,b^5+435\,a^3\,b^2\,B+45\,a\,b^4\,B+189\,a^4\,b\,C+483\,a^2\,b^3\,C\right)$$

$$\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\mathrm{Csc}[c+d\,x]\ \mathrm{EllipticPi}\left[-\frac{a}{b},\ \mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\ \sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \Bigg(\frac{2}{63}\mathrm{Sec}[c+d\,x]^4\left(19\,a\,A\,b\,\mathrm{Sin}[c+d\,x]+9\,a^2\,B\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\frac{2}{315}\mathrm{Sec}[c+d\,x]^3\left(49\,a^2\,A\,\mathrm{Sin}[c+d\,x]+75\,A\,b^2\,\mathrm{Sin}[c+d\,x]+135\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+63\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\frac{1}{315\,a}2\,\mathrm{Sec}[c+d\,x]^2\left(163\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]+5\,A\,b^3\,\mathrm{Sin}[c+d\,x]+75\,a^3\,B\,\mathrm{Sin}[c+d\,x]+135\,a\,b^2\,B\,\mathrm{Sin}[c+d\,x]+231\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\frac{1}{315\,a^2}2\,\mathrm{Sec}[c+d\,x]\left(147\,a^4\,A\,\mathrm{Sin}[c+d\,x]+279\,a^2\,A\,b^2\,\mathrm{Sin}[c+d\,x]-10\,A\,b^4\,\mathrm{Sin}[c+d\,x]+435\,a^3\,b\,B\,\mathrm{Sin}[c+d\,x]+\right.$$

$$\left.45\,a\,b^3\,B\,\mathrm{Sin}[c+d\,x]+189\,a^4\,C\,\mathrm{Sin}[c+d\,x]+483\,a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)+\frac{2}{9}a^2\,A\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Tan}[c+d\,x]\Bigg)$$

- **Problem 1136: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\mathrm{Cos}[c+d\,x]^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 593 leaves, 8 steps) :

$$-\frac{1}{24\,a\,b^3\,d}(a-b)\sqrt{a+b}\left(24\,A\,b^2-18\,a\,b\,B+15\,a^2\,C+16\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{24\,b^3\,d}\sqrt{a+b}\left(24\,A\,b^2-18\,a\,b\,B+12\,b^2\,B+15\,a^2\,C-10\,a\,b\,C+16\,b^2\,C\right)$$
$$\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^4\,d}$$
$$\sqrt{a+b}\left(6\,a^2\,b\,B+8\,b^3\,B-5\,a^3\,C-4\,a\,b^2\,(2\,A+C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{\left(24\,A\,b^2-18\,a\,b\,B+15\,a^2\,C+16\,b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,b^3\,d\,\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{(6\,b\,B-5\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{12\,b^2\,d}+\frac{C\,\text{Cos}[c+d\,x]^{3/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,b\,d}$$

Result (type 4, 1241 leaves) :

$$\frac{1}{48\,b^2\,d}\Bigg(-\Bigg(4\,a\left(24\,A\,b^2-6\,a\,b\,B+5\,a^2\,C+16\,b^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$
$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}(c+d\,x)\Big]^4\Bigg)\Big/$$
$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(24\,b^2\,B+4\,a\,b\,C\right)$$
$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(24\,A\,b^2-18\,a\,b\,B+15\,a^2\,C+16\,b^2\,C\right)\left(\frac{\mathrm{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.$$

$$\text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)+\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{(6\,b\,B-5\,a\,C)\,\text{Sin}[c+d\,x]}{12\,b^2}+\frac{C\,\text{Sin}[2\,(c+d\,x)]}{6\,b}\right)}{d}$$

- **Problem 1137: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 485 leaves, 7 steps):

$$-\frac{1}{4\,a\,b^2\,d}(a-b)\,\sqrt{a+b}\,(4\,b\,B-3\,a\,C)\,\text{Cot}[c+d\,x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^2\,d}$$
$$\sqrt{a+b}\,(3\,a\,C-2\,b\,(2\,B+C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{4\,b^3\,d}\sqrt{a+b}\,\left(8\,A\,b^2-4\,a\,b\,B+3\,a^2\,C+4\,b^2\,C\right)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\ \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$
$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{(4\,b\,B-3\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d}$$

Result (type 4, 1182 leaves):

$$\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d}+\frac{1}{8\,b\,d}$$

$$\Bigg(-\Bigg(4\,a\,(4\,b\,B-a\,C)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a$$

$$(8\,A\,b+4\,b\,C)\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(4\,b\,B-3\,a\,C)\,\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}\right.+$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\text{Csc}[c+dx]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+dx]\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+dx]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+dx])\,\text{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{b\sqrt{\text{Cos}[c+dx]}}\right)$$

- **Problem 1138: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2}{\sqrt{\text{Cos}[c+dx]}\sqrt{a+b\,\text{Cos}[c+dx]}}\,dx$$

Optimal (type 4, 401 leaves, 6 steps) :

$$-\frac{1}{a\,b\,d}(a-b)\sqrt{a+b}\ C\,\text{Cot}[c+d\,x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{a\,b\,d}$$

$$\sqrt{a+b}\ (2\,A\,b+a\,C)\ \text{Cot}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{b^2\,d}$$

$$\sqrt{a+b}\ (2\,b\,B-a\,C)\ \text{Cot}[c+d\,x]\ \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{C\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b\,d\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1117 leaves):

$$\frac{1}{2\,d}\left(-\left(\left(4\,a\,(2\,A+C)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$8\,a\,B\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\middle/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,C\left(\frac{\mathrm{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\middle/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 1139: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A + B\,\text{Cos}[c + d\,x] + C\,\text{Cos}[c + d\,x]^2}{\text{Cos}[c + d\,x]^{3/2}\,\sqrt{a + b\,\text{Cos}[c + d\,x]}}\,dx$$

Optimal (type 4, 347 leaves, 5 steps) :

$$\frac{1}{a^2\,d}2\,A\,(a-b)\,\sqrt{a+b}\,\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{a\,d}$$
$$2\,\sqrt{a+b}\,(A-B)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{b\,d}2\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}$$

Result (type 4, 1169 leaves) :

$$\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{a\,d\,\sqrt{\text{Cos}[c+d\,x]}}-$$
$$\frac{1}{a\,d}\left(-\left(4\,a\,(A\,b-a\,B)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$
$$4\,a\,(a\,A-a\,C)\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$
$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,A\,b\left(\frac{\mathrm{i}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

## Problem 1140: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 293 leaves, 4 steps):

$$-\frac{1}{3\,a^3\,d}$$

$$2\,(a-b)\,\sqrt{a+b}\,\,(2\,A\,b-3\,a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{3\,a^2\,d}2\,\sqrt{a+b}\,\,(2\,A\,b+a\,(A-3\,B+3\,C))\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{3\,a\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1244 leaves):

$$\frac{1}{3\,a^2\,d}\Bigg(-\Bigg(4\,a\,\left(a^2\,A+2\,A\,b^2-3\,a\,b\,B+3\,a^2\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Bigg[\text{ArcSin}\Bigg[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Bigg],\,-\frac{2\,a}{-a+b}\Bigg]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(2\,a\,A\,b-3\,a^2\,B\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(2\,A\,b^2-3\,a\,b\,B\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\text{Sec}[c+d\,x]\,(-2\,A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])}{3\,a^2}+\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a}\right)}{d}$$

- **Problem 1141: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 372 leaves, 5 steps):

$$\frac{1}{15\,a^4\,d}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2-10\,a\,b\,B+3\,a^2\,(3\,A+5\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{15\,a^3\,d}$$

$$2\sqrt{a+b}\,\left(8\,A\,b^2-2\,a\,b\,(A+5\,B)+a^2\,(9\,A-5\,B+15\,C)\right)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Cos}[c+d\,x]^{5/2}}-\frac{2\,(4\,A\,b-5\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,a^2\,d\,\text{Cos}[c+d\,x]^{3/2}}$$

Result (type 4, 1351 leaves):

$$-\frac{1}{15 a^3 d}\Bigg(-\Bigg(4 a \left(7 a^2 A b+8 A b^3-5 a^3 B-10 a b^2 B+15 a^2 b C\right) \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Big/$$

$$\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-4 a \left(9 a^3 A+8 a A b^2-10 a^2 b B+15 a^3 C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Big/\left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]$$

$$\operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Big/\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\Bigg)+$$

$$2 \left(9 a^2 A b+8 A b^3-10 a b^2 B+15 a^2 b C\right)\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a \left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right) -$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right) + \frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right) +$$

$$\frac{1}{d} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]} \left(\frac{2 \operatorname{Sec}[c+d x]^2 (-4 A b \operatorname{Sin}[c+d x] + 5 a B \operatorname{Sin}[c+d x])}{15 a^2} +\right.$$

$$\frac{2 \operatorname{Sec}[c+d x] \left(9 a^2 A \operatorname{Sin}[c+d x] + 8 A b^2 \operatorname{Sin}[c+d x] - 10 a b B \operatorname{Sin}[c+d x] + 15 a^2 C \operatorname{Sin}[c+d x]\right)}{15 a^3} +$$

$$\left.\frac{2 A \operatorname{Sec}[c+d x]^2 \operatorname{Tan}[c+d x]}{5 a}\right)$$

- **Problem 1142: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A + B \operatorname{Cos}[c+d x] + C \operatorname{Cos}[c+d x]^2}{\operatorname{Cos}[c+d x]^{9/2} \sqrt{a+b \operatorname{Cos}[c+d x]}} \, dx$$

Optimal (type 4, 466 leaves, 6 steps):

$$-\frac{1}{105 a^5 d}2 (a-b) \sqrt{a+b} \left(48 A b^3-63 a^3 B-56 a b^2 B+a^2 (44 A b+70 b C)\right)$$

$$\text{Cot}[c+d x] \,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{1}{105 a^4 d}2 \sqrt{a+b} \left(48 A b^3-4 a b^2 (3 A+14 B)+a^3 (25 A-63 B+35 C)+2 a^2 b (22 A+7 (B+5 C))\right) \text{Cot}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{2 A \sqrt{a+b \,\text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{7 a d \,\text{Cos}[c+d x]^{7/2}}-$$

$$\frac{2 (6 A b-7 a B) \sqrt{a+b \,\text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{35 a^2 d \,\text{Cos}[c+d x]^{5/2}}+\frac{2 \left(24 A b^2-28 a b B+5 a^2 (5 A+7 C)\right) \sqrt{a+b \,\text{Cos}[c+d x]} \,\text{Sin}[c+d x]}{105 a^3 d \,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1468 leaves) :

$$\frac{1}{105 a^4 d}\left(-\left(4 a \left(25 a^4 A+32 a^2 A b^2+48 A b^4-49 a^3 b B-56 a b^3 B+35 a^4 C+70 a^2 b^2 C\right)\right.\right.$$

$$\sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}$$

$$\left.\text{Csc}[c+d x] \,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \,\text{Cos}[c+d x]}\right)-4 a \left(44 a^3 A b+48 a A b^3-63 a^4 B-56 a^2 b^2 B+70 a^3 b C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\,\left(44\,a^2\,A\,b^2+48\,A\,b^4-63\,a^3\,b\,B-56\,a\,b^3\,B+70\,a^2\,b^2\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\,\left(\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+$$

$$\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\frac{2\,\mathrm{Sec}[c+d\,x]^3\,(-6\,A\,b\,\mathrm{Sin}[c+d\,x]+7\,a\,B\,\mathrm{Sin}[c+d\,x])}{35\,a^2}+\right.$$

$$\frac{2\,\mathrm{Sec}[c+d\,x]^2\,\left(25\,a^2\,A\,\mathrm{Sin}[c+d\,x]+24\,A\,b^2\,\mathrm{Sin}[c+d\,x]-28\,a\,b\,B\,\mathrm{Sin}[c+d\,x]+35\,a^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{105\,a^3}+$$

$$1\Big/\left(105\,a^4\right)2\,\mathrm{Sec}[c+d\,x]$$

$$\left(-44\,a^2\,A\,b\,\mathrm{Sin}[c+d\,x]-48\,A\,b^3\,\mathrm{Sin}[c+d\,x]+63\,a^3\,B\,\mathrm{Sin}[c+d\,x]+56\,a\,b^2\,B\,\mathrm{Sin}[c+d\,x]-70\,a^2\,b\,C\,\mathrm{Sin}[c+d\,x]\right)+$$

$$\left.\frac{2\,A\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Tan}[c+d\,x]}{7\,a}\right)$$

- **Problem 1143: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(a\,A+(A\,b+a\,B)\,\mathrm{Cos}[c+d\,x]+b\,B\,\mathrm{Cos}[c+d\,x]^2\right)}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 473 leaves, 8 steps) :

$$-\frac{1}{4\,a\,b\,d}\Bigg((a-b)\sqrt{a+b}\,(4\,A\,b+a\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{4\,b\,d}\sqrt{a+b}\,(4\,A\,b+(a+2\,b)\,B)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{4\,b^2\,d}\sqrt{a+b}\,\big(4\,a\,A\,b-a^2\,B+4\,b^2\,B\big)\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$

$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{(4\,A\,b+a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\text{Cos}[c+d\,x]}}+\frac{B\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}$$

Result (type 4, 1175 leaves) :

$$\frac{B\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d}+\frac{1}{8\,d}$$

$$\Bigg(-\Bigg(4\,a\,(4\,A\,b+3\,a\,B)\,\sqrt{\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/\Big((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)-4\,a$$

$$(8\,a\,A+4\,b\,B)\,\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Big],-\frac{2\,a}{-a+b}\Big]\,\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/\Big((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\Big)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,(4\,A\,b+a\,B)\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 1145: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 660 leaves, 8 steps) :

$$-\frac{1}{4\,a\,b^3\sqrt{a+b}\,d}\left(12\,a^2\,b\,B-4\,b^3\,B-a\,b^2\,(8\,A-7\,C)-15\,a^3\,C\right)\text{Cot}[c+d\,x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^3\sqrt{a+b}\,d}$$
$$\left(8\,A\,b^2-a\,b\,(12\,B-5\,C)+15\,a^2\,C-2\,b^2\,(2\,B+C)\right)\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^4\,d}\sqrt{a+b}\left(8\,A\,b^2-12\,a\,b\,B+15\,a^2\,C+4\,b^2\,C\right)\text{Cot}[c+d\,x]$$
$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{b\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{\left(12\,a^2\,b\,B-4\,b^3\,B-a\,b^2\,(8\,A-7\,C)-15\,a^3\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^3\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d\,x]}}+$$
$$\frac{\left(4\,A\,b^2-4\,a\,b\,B+5\,a^2\,C-b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b^2\left(a^2-b^2\right)d}$$

Result (type 4, 1322 leaves) :

$$\frac{\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(\frac{C\,\text{Sin}[c+d\,x]}{2\,b^2}-\frac{2\left(a\,A\,b^2\,\text{Sin}[c+d\,x]-a^2\,b\,B\,\text{Sin}[c+d\,x]+a^3\,C\,\text{Sin}[c+d\,x]\right)}{b^2\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d\,x])}\right)}{d}-$$

$$\frac{1}{8\,(a-b)\,b^2\,(a+b)\,d}\left(-\left(4\,a\,\left(-4\,a^2\,b\,B+4\,b^3\,B+5\,a^3\,C-5\,a\,b^2\,C\right)\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\,\left(8\,A\,b^3-8\,a\,b^2\,B+4\,a^2\,b\,C+4\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+2\,\left(8\,a\,A\,b^2-12\,a^2\,b\,B+4\,b^3\,B+15\,a^3\,C-7\,a\,b^2\,C\right)$$

$$\left(\frac{i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right] \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[i \operatorname{ArcSinh}\left[\frac{\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right] \operatorname{Sec}[c+d x]}{b \sqrt{\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Sec}[c+d x]} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b} 2 a\left(\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \operatorname{Csc}[c+d x]\right.\right.$$

$$\left.\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)-$$

$$\left(a \sqrt{\frac{(a+b) \operatorname{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \operatorname{Cos}[c+d x] \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[-\frac{a}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{\frac{(a+b \operatorname{Cos}[c+d x]) \operatorname{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right) \Big/$$

$$\left.\left.\left(b \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+b \operatorname{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sin}[c+d x]}{b \sqrt{\operatorname{Cos}[c+d x]}}\right)\right)$$

- **Problem 1146: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{\operatorname{Cos}[c+d x]} \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right)}{(a+b \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 4, 535 leaves, 7 steps) :

$$-\frac{1}{a\, b^2 \sqrt{a+b}\, d}\left(2 A b^2-2 a b B+3 a^2 C-b^2 C\right) \text{Cot}[c+d x]\, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{1}{a\, b^2 \sqrt{a+b}\, d}\left(2 A b^2-a (b (2 B-C)-3 a C)\right) \text{Cot}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{b^3 d}$$

$$\sqrt{a+b}\, (2 b B-3 a C) \text{Cot}[c+d x]\, \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{2 \left(A b^2-a (b B-a C)\right) \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{b \left(a^2-b^2\right) d \sqrt{a+b \text{Cos}[c+d x]}}+\frac{\left(2 A b^2-2 a b B+3 a^2 C-b^2 C\right) \sqrt{a+b \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{b^2 \left(a^2-b^2\right) d \sqrt{\text{Cos}[c+d x]}}$$

Result (type 4, 1256 leaves) :

$$\frac{2 \sqrt{\text{Cos}[c+d x]} \left(A b^2 \text{Sin}[c+d x]-a b B \text{Sin}[c+d x]+a^2 C \text{Sin}[c+d x]\right)}{b \left(-a^2+b^2\right) d \sqrt{a+b \text{Cos}[c+d x]}}+$$

$$\frac{1}{2 (a-b)\, b\, (a+b)\, d}\left(-\left(\left(4 a \left(a^2 C-b^2 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right)\Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]}\, \sqrt{a+b \text{Cos}[c+d x]}\right)-4 a \left(2 a A b-2 b^2 B+2 a b C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}}\, \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(2\,A\,b^2-2\,a\,b\,B+3\,a^2\,C-b^2\,C\right)\left(\frac{\mathbb{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\mathbb{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 1147: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 436 leaves, 6 steps):

$$\frac{1}{a^2\,b\,\sqrt{a+b}\,d}$$

$$2\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{a\,b\,\sqrt{a+b}\,d}2\,(A\,b+b\,B-a\,C)\,\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{b^2\,d}2\,\sqrt{a+b}\,C\,\text{Cot}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\,\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Sin}[c+d\,x]}{b\left(a^2-b^2\right)d\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1245 leaves):

$$\frac{2\,\sqrt{\text{Cos}[c+d\,x]}\,\left(A\,b^2\,\text{Sin}[c+d\,x]-a\,b\,B\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]\right)}{a\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{1}{a\,(a-b)\,(a+b)\,d}\left(-\left(\left(4\,a\,\left(a^2\,A-A\,b^2\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.\right.$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-a\,A\,b+a^2\,B-a\,b\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$2\,\left(-A\,b^2+a\,b\,B-a^2\,C\right)\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\,\mathrm{Csc}[c+dx]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+dx)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+dx]\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+dx]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+dx])\,\mathrm{Csc}\left[\frac{1}{2}(c+dx)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+dx)\right]^4\right)\Big/$$

$$\left.\left.\left(b\sqrt{\mathrm{Cos}[c+dx]}\,\sqrt{a+b\,\mathrm{Cos}[c+dx]}\right)\right)+\frac{\sqrt{a+b\,\mathrm{Cos}[c+dx]}\,\mathrm{Sin}[c+dx]}{b\sqrt{\mathrm{Cos}[c+dx]}}\right)$$

- **Problem 1148: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+dx]+C\,\mathrm{Cos}[c+dx]^2}{\mathrm{Cos}[c+dx]^{3/2}\,(a+b\,\mathrm{Cos}[c+dx])^{3/2}}\,dx$$

Optimal (type 4, 322 leaves, 4 steps):

$$-\frac{1}{a^3\sqrt{a+b}\,d}2\left(2 A b^2-a b B-a^2 (A-C)\right)\text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-\frac{1}{a^2\sqrt{a+b}\,d}$$

$$2 (2 A b+a (A-B-C))\,\text{Cot}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{2\left(A b^2-a (b B-a C)\right)\text{Sin}[c+d x]}{a\left(a^2-b^2\right)d\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 4, 1306 leaves):

$$\frac{1}{a^2 (-a+b) (a+b) d}\left(\left(-4 a\left(2 a^2 A b-2 A b^3-a^3 B+a b^2 B\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(a^3 A-2 a A b^2+a^2 b B-a^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.$$

$$\left.\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+$$

$$2\left(a^2\,A\,b-2\,A\,b^3+a\,b^2\,B-a^2\,b\,C\right)\left(\frac{\mathrm{i}\,\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\mathrm{i}\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]}\right)+\frac{\sqrt{a+b \text{Cos}[c+d x]} \text{ Sin}[c+d x]}{b \sqrt{\text{Cos}[c+d x]}}\right)\right)+$$

$$\frac{\sqrt{\text{Cos}[c+d x]} \sqrt{a+b \text{Cos}[c+d x]} \left(-\frac{2 \left(A b^3 \text{Sin}[c+d x]-a b^2 B \text{Sin}[c+d x]+a^2 b C \text{Sin}[c+d x]\right)}{a^2 \left(a^2-b^2\right) (a+b \text{Cos}[c+d x])}+\frac{2 A \text{Tan}[c+d x]}{a^2}\right)}{d}$$

## Problem 1149: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{5/2} (a+b \text{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 4, 424 leaves, 5 steps) :

$$\frac{1}{3 a^4 \sqrt{a+b} \, d} 2 \left(8 A b^3+3 a^3 B-6 a b^2 B-a^2 (5 A b-3 b C)\right) \text{Cot}[c+d x] \text{ EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+\frac{1}{3 a^3 \sqrt{a+b} \, d} 2 \left(8 A b^2+6 a b (A-B)+a^2 (A-3 B+3 C)\right)$$

$$\text{Cot}[c+d x] \text{ EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{2 \left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{a \left(a^2-b^2\right) d \text{ Cos}[c+d x]^{3/2} \sqrt{a+b \text{Cos}[c+d x]}}-\frac{2 \left(4 A b^2-3 a b B-a^2 (A-3 C)\right) \sqrt{a+b \text{Cos}[c+d x]} \text{ Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right) d \text{ Cos}[c+d x]^{3/2}}$$

Result (type 4, 1402 leaves) :

$$\frac{1}{3 a^3 (a-b) (a+b) d}$$

$$\left(\left(-\left(4 a \left(a^4 A+7 a^2 A b^2-8 A b^4-6 a^3 b B+6 a b^3 B+3 a^4 C-3 a^2 b^2 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.\right.$$

$$\left.\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \text{ Csc}[c+d x] \text{ EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-4 a\left(5 a^3 A b-8 a A b^3-3 a^4 B+6 a^2 b^2 B-3 a^3 b C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d x]}\sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+2\left(5 a^2 A b^2-8 A b^4-3 a^3 b B+6 a b^3 B-3 a^2 b^2 C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d x)\right]\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d x)\right]}{\sqrt{\text{Cos}[c+d x]}}\right],-\frac{2 a}{-a-b}\right]\text{Sec}[c+d x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d x)\right]^2\text{Sec}[c+d x]}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Sec}[c+d x]}{a+b}}}+\right.$$

$$\frac{1}{b}2 a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\,\text{Csc}[c+d x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\left.\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}$$

$$\left(\frac{2\,\text{Sec}[c+d\,x]\,(-5\,A\,b\,\text{Sin}[c+d\,x]+3\,a\,B\,\text{Sin}[c+d\,x])}{3\,a^3}+\frac{2\left(A\,b^4\,\text{Sin}[c+d\,x]-a\,b^3\,B\,\text{Sin}[c+d\,x]+a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{a^3\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])}+\right.$$

$$\left.\frac{2\,A\,\text{Sec}[c+d\,x]\,\text{Tan}[c+d\,x]}{3\,a^2}\right)$$

- **Problem 1150: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{7/2}\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 545 leaves, 6 steps) :

$$-\frac{1}{15 a^5 \sqrt{a+b}\, d} 2 \left(48 A b^4+25 a^3 b B-40 a b^3 B-6 a^2 b^2 (4 A-5 C)-3 a^4 (3 A+5 C)\right)$$

$$\text{Cot}[c+d x]\, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{1}{15 a^4 \sqrt{a+b}\, d} 2 \left(48 A b^3+4 a b^2 (9 A-10 B)+6 a^2 b (2 A-5 B+5 C)+a^3 (9 A-5 B+15 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b}\, \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{2 \left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{a \left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{5/2} \sqrt{a+b \,\text{Cos}[c+d x]}} - \frac{2 \left(6 A b^2-5 a b B-a^2 (A-5 C)\right) \sqrt{a+b \,\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{5 a^2 \left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{5/2}} +$$

$$\frac{2 \left(24 A b^3+5 a^3 B-20 a b^2 B-a^2 (9 A b-15 b C)\right) \sqrt{a+b \,\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{15 a^3 \left(a^2-b^2\right) d\, \text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1511 leaves) :

$$\frac{1}{15 a^4 (-a+b) (a+b) d} \left(-\left(4 a \left(12 a^4 A b+36 a^2 A b^3-48 A b^5-5 a^5 B-35 a^3 b^2 B+40 a b^4 B+30 a^4 b C-30 a^2 b^3 C\right)\right.\right.$$

$$\sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x]\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]} \sqrt{a+b \,\text{Cos}[c+d x]}\right) -$$

$$4 a \left(9 a^5 A+24 a^3 A b^2-48 a A b^4-25 a^4 b B+40 a^2 b^3 B+15 a^5 C-30 a^3 b^2 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x]\, \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}} \sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\left(9\,a^4\,A\,b+24\,a^2\,A\,b^3-48\,A\,b^5-25\,a^3\,b^2\,B+40\,a\,b^4\,B+15\,a^4\,b\,C-30\,a^2\,b^3\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d x]\,\text{EllipticPi}\left[-\frac{a}{b},\,\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],\,-\frac{2 a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\Bigg)\Bigg)+$$

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}\,\Bigg(\frac{2\,\text{Sec}[c+d x]^2\,(-9 A b\,\text{Sin}[c+d x]+5 a B\,\text{Sin}[c+d x])}{15 a^3}+$$

$$\frac{2\,\text{Sec}[c+d x]\left(9 a^2 A\,\text{Sin}[c+d x]+33 A b^2\,\text{Sin}[c+d x]-25 a b B\,\text{Sin}[c+d x]+15 a^2 C\,\text{Sin}[c+d x]\right)}{15 a^4}-$$

$$\frac{2\left(A b^5\,\text{Sin}[c+d x]-a b^4 B\,\text{Sin}[c+d x]+a^2 b^3 C\,\text{Sin}[c+d x]\right)}{a^4\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d x])}+$$

$$\frac{2 A\,\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]}{5 a^2}\Bigg)$$

- **Problem 1151: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d x]^{3/2}\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{(a+b\,\text{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 4, 723 leaves, 8 steps) :

$$\frac{1}{3\,a\,(a-b)\,b^3\,(a+b)^{3/2}\,d}\left(8\,A\,b^4+6\,a^3\,b\,B-14\,a\,b^3\,B-15\,a^4\,C+26\,a^2\,b^2\,C-3\,b^4\,C\right)$$

$$\text{Cot}[c+d\,x]\;\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\;-$$

$$\frac{1}{3\,a\,b^3\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d}\left(6\,A\,b^4-a\,b^3\,(2\,A+3\,(4\,B-C))+a^3\,b\,(6\,B-5\,C)-15\,a^4\,C+a^2\,b^2\,(2\,B+21\,C)\right)\,\text{Cot}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\;-\frac{1}{b^4\,d}$$

$$\sqrt{a+b}\;(2\,b\,B-5\,a\,C)\;\text{Cot}[c+d\,x]\;\text{EllipticPi}\Big[\frac{a+b}{b},\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\Big],-\frac{a+b}{a-b}\Big]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\;-$$

$$\frac{2\,\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{Cos}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\,\left(3\,A\,b^4+2\,a^3\,b\,B-6\,a\,b^3\,B-5\,a^4\,C+a^2\,b^2\,(A+9\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,b^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{\left(8\,A\,b^4+6\,a^3\,b\,B-14\,a\,b^3\,B-15\,a^4\,C+26\,a^2\,b^2\,C-3\,b^4\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{3\,b^3\,\left(a^2-b^2\right)^2\,d\,\sqrt{\text{Cos}[c+d\,x]}}$$

Result (type 4, 1448 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\left(-\frac{2\,\left(a\,A\,b^2\,\text{Sin}[c+d\,x]-a^2\,b\,B\,\text{Sin}[c+d\,x]+a^3\,C\,\text{Sin}[c+d\,x]\right)}{3\,b^2\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}+\right.$$

$$\left(2\,\left(4\,A\,b^4\,\text{Sin}[c+d\,x]+3\,a^3\,b\,B\,\text{Sin}[c+d\,x]-7\,a\,b^3\,B\,\text{Sin}[c+d\,x]-6\,a^4\,C\,\text{Sin}[c+d\,x]+10\,a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)\right)\Big/$$

$$\left.\left(3\,b^2\,\left(-a^2+b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])\right)\right)+\frac{1}{6\,(a-b)^2\,b^2\,(a+b)^2\,d}$$

$$\Bigg(\Bigg(-4\,a\,\left(2\,a^2\,A\,b^2-2\,A\,b^4-2\,a^3\,b\,B+2\,a\,b^3\,B+5\,a^4\,C-8\,a^2\,b^2\,C+3\,b^4\,C\right)\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}$$

$$\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\Bigg[\text{ArcSin}\Bigg[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\Bigg],-\frac{2\,a}{-a+b}\Bigg]\;\text{Sin}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4\Bigg)\Big/$$

$$\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\left(-8\,a\,A\,b^3+2\,a^2\,b^2\,B+6\,b^4\,B+4\,a^3\,b\,C-12\,a\,b^3\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-8\,A\,b^4-6\,a^3\,b\,B+14\,a\,b^3\,B+15\,a^4\,C-26\,a^2\,b^2\,C+3\,b^4\,C\right)$$

$$\left(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left.\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\,\sqrt{\text{Cos}[c+d\,x]}}\right)\right)$$

- **Problem 1152: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 589 leaves, 7 steps) :

$$-\frac{1}{3 a^2 b^2 \sqrt{a+b}\,(a^2-b^2)\, d} 2 \left(A b^4 - 4 a b^3 B - 3 a^4 C + a^2 b^2 (3 A + 7 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{1}{3 a b^2 \sqrt{a+b}\,(a^2-b^2)\, d} 2 \left(b^3 (A+3 B) + 3 a^3 C + a^2 b C - a b^2 (3 A + B + 6 C)\right) \text{Cot}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{b^3 d}$$

$$2 \sqrt{a+b}\; C \,\text{Cot}[c+d x]\, \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b \,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{2 \left(A b^2 - a (b B - a C)\right) \sqrt{\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{3 b (a^2-b^2)\, d\, (a+b \,\text{Cos}[c+d x])^{3/2}} + \frac{2 \left(A b^4 - 4 a b^3 B - 3 a^4 C + a^2 b^2 (3 A + 7 C)\right) \text{Sin}[c+d x]}{3 b^2 (a^2-b^2)^2 d \sqrt{\text{Cos}[c+d x]}\, \sqrt{a+b \,\text{Cos}[c+d x]}}$$

Result (type 4, 1441 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d x]}\; \sqrt{a+b \,\text{Cos}[c+d x]} \left(\frac{2 \left(A b^2 \,\text{Sin}[c+d x] - a b B \,\text{Sin}[c+d x] + a^2 C \,\text{Sin}[c+d x]\right)}{3 b \left(-a^2+b^2\right) (a+b \,\text{Cos}[c+d x])^2} + \right.$$

$$\left(2 \left(-3 a^2 A b^2 \,\text{Sin}[c+d x] - A b^4 \,\text{Sin}[c+d x] + 4 a b^3 B \,\text{Sin}[c+d x] + 3 a^4 C \,\text{Sin}[c+d x] - 7 a^2 b^2 C \,\text{Sin}[c+d x]\right)\right) \Big/$$

$$\left.\left(3 a b \left(a^2-b^2\right)^2 (a+b \,\text{Cos}[c+d x])\right)\right) - \frac{1}{3 a (a-b)^2 b (a+b)^2 d}$$

$$\left(-\left(4 a \left(a^2 A b^2 - A b^4 - a^3 b B + a b^3 B + a^4 C - a^2 b^2 C\right) \sqrt{\frac{(a+b) \,\text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}} \sqrt{-\frac{(a+b) \,\text{Cos}[c+d x] \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\; \text{Csc}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \,\text{Cos}[c+d x]) \,\text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right], -\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\right) \Big/$$

$$\left((a+b) \sqrt{\text{Cos}[c+d x]}\; \sqrt{a+b \,\text{Cos}[c+d x]}\right) - 4 a \left(-3 a^3 A b - a A b^3 + 4 a^2 b^2 B - a^3 b C - 3 a b^3 C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\;\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-3\,a^2\,A\,b^2-A\,b^4+4\,a\,b^3\,B+3\,a^4\,C-7\,a^2\,b^2\,C\right)$$

$$\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\;\text{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\Bigg)\Bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\Bigg)\Bigg)$$

- **Problem 1153: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\sqrt{\text{Cos}[c+d\,x]}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 457 leaves, 5 steps) :

$$\frac{1}{3\,a^3\,(a-b)\,(a+b)^{3/2}\,d}2\left(6\,a^2\,A\,b-2\,A\,b^3-3\,a^3\,B-a\,b^2\,B+4\,a^2\,b\,C\right)\text{Cot}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,a^2\sqrt{a+b}\left(a^2-b^2\right)d}2\left(2\,A\,b^2-a^2\,(3\,A+3\,B+C)+a\,b\,(3\,A+B+3\,C)\right)$$

$$\text{Cot}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+\frac{2\left(2\,A\,b^3+3\,a^3\,B+a\,b^2\,B-2\,a^2\,b\,(3\,A+2\,C)\right)\text{Sin}[c+d\,x]}{3\,a\left(a^2-b^2\right)^2d\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1440 leaves) :

$$\frac{1}{d}\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(\frac{2\,\left(A\,b^2\,\text{Sin}[c+d\,x]-a\,b\,B\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]\right)}{3\,a\,\left(a^2-b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}-\right.$$

$$\left(2\,\left(-6\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]+2\,A\,b^4\,\text{Sin}[c+d\,x]+3\,a^3\,b\,B\,\text{Sin}[c+d\,x]+a\,b^3\,B\,\text{Sin}[c+d\,x]-4\,a^2\,b^2\,C\,\text{Sin}[c+d\,x]\right)\right)\Big/$$

$$\left.\left(3\,a^2\,\left(a^2-b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])\right)\right)+\frac{1}{3\,a^2\,(a-b)^2\,(a+b)^2\,d}$$

$$\left(-\left(4\,a\,\left(3\,a^4\,A-5\,a^2\,A\,b^2+2\,A\,b^4-a^3\,b\,B+a\,b^3\,B+a^4\,C-a^2\,b^2\,C\right)\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.\right.$$

$$\left.\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-4\,a\,\left(-6\,a^3\,A\,b+2\,a\,A\,b^3+3\,a^4\,B+a^2\,b^2\,B-4\,a^3\,b\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left(b\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+2\left(-6\,a^2\,A\,b^2+2\,A\,b^4+3\,a^3\,b\,B+a\,b^3\,B-4\,a^2\,b^2\,C\right)$$

$$\left(\frac{\text{i}\,\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\text{i}\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],\ -\frac{2\,a}{-a-b}\right]\text{Sec}[c+d\,x]}{b\sqrt{\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Sec}[c+d\,x]}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}2\,a\left(\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \text{Csc}[c+d\,x]\right.\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\ \sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\ \text{EllipticPi}\left[-\frac{a}{b},\ \text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],\ -\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Bigg/$$

$$\left.\left.\left(b\sqrt{\text{Cos}[c+d x]}\;\sqrt{a+b\,\text{Cos}[c+d x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\;\text{Sin}[c+d x]}{b\sqrt{\text{Cos}[c+d x]}}\right)\right)$$

- **Problem 1154: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2}{\text{Cos}[c+d x]^{3/2}\,(a+b\,\text{Cos}[c+d x])^{5/2}}\,dx$$

Optimal (type 4, 495 leaves, 5 steps):

$$\frac{1}{3a^4\sqrt{a+b}\,(a^2-b^2)\,d}2\left(8 A b^4+6 a^3 b B-2 a b^3 B+3 a^4 (A-C)-a^2 b^2 (15 A+C)\right)$$
$$\text{Cot}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\;\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{1}{3a^3\sqrt{a+b}\,(a^2-b^2)\,d}2\left(8 A b^3+2 a b^2 (3 A-B)-3 a^3 (A-B-C)-a^2 b (9 A+3 B+C)\right)\text{Cot}[c+d x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\text{Sec}[c+d x])}{a+b}}\;\sqrt{\frac{a(1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{2\left(A b^2-a (b B-a C)\right)\text{Sin}[c+d x]}{3a\,(a^2-b^2)\,d\,\sqrt{\text{Cos}[c+d x]}\,(a+b\,\text{Cos}[c+d x])^{3/2}}-\frac{2\left(4 A b^4+5 a^3 b B-a b^3 B-2 a^4 C-2 a^2 b^2 (4 A+C)\right)\text{Sin}[c+d x]}{3a^2\,(a^2-b^2)^2\,d\,\sqrt{\text{Cos}[c+d x]}\,\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 4, 1516 leaves):

$$-\frac{1}{3a^3(a-b)^2(a+b)^2 d}\left(-\left(4 a\left(9 a^4 A b-17 a^2 A b^3+8 A b^5-3 a^5 B+5 a^3 b^2 B-2 a b^4 B+a^4 b C-a^2 b^3 C\right)\right.\right.$$
$$\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d x)\right]^2}{-a+b}}\;\sqrt{-\frac{(a+b)\,\text{Cos}[c+d x]\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}\;\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}$$
$$\left.\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d x])\,\text{Csc}\left[\frac{1}{2}(c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d x)\right]^4\right)\Big/$$

$$\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-4\,a\left(3\,a^5\,A-15\,a^3\,A\,b^2+8\,a\,A\,b^4+6\,a^4\,b\,B-2\,a^2\,b^3\,B-3\,a^5\,C-a^3\,b^2\,C\right)$$

$$\left(\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\left.\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/\left((a+b)\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)-$$

$$\left(\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\right)\Big/$$

$$\left.\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)\right)+2\left(3\,a^4\,A\,b-15\,a^2\,A\,b^3+8\,A\,b^5+6\,a^3\,b^2\,B-2\,a\,b^4\,B-3\,a^4\,b\,C-a^2\,b^3\,C\right)$$

$$\left(\frac{i\,\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\frac{\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\mathrm{Sec}[c+d\,x]}{b\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}[c+d\,x]}{a+b}}}+\right.$$

$$\frac{1}{b}\,2\,a\left(\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\mathrm{Csc}[c+d\,x]\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\bigg/\left((a+b)\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\right.$$

$$\left.\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\bigg/$$

$$\left(b\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\right)+\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\sqrt{\text{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}$$

$$\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+b\,\text{Cos}[c+d\,x]}\left(-\frac{2\left(A\,b^3\,\text{Sin}[c+d\,x]-a\,b^2\,B\,\text{Sin}[c+d\,x]+a^2\,b\,C\,\text{Sin}[c+d\,x]\right)}{3\,a^2\left(a^2-b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}-\right.$$

$$\left(2\left(9\,a^2\,A\,b^3\,\text{Sin}[c+d\,x]-5\,A\,b^5\,\text{Sin}[c+d\,x]-6\,a^3\,b^2\,B\,\text{Sin}[c+d\,x]+2\,a\,b^4\,B\,\text{Sin}[c+d\,x]+3\,a^4\,b\,C\,\text{Sin}[c+d\,x]+a^2\,b^3\,C\,\text{Sin}[c+d\,x]\right)\right)\bigg/$$

$$\left.\left(3\,a^3\left(a^2-b^2\right)^2(a+b\,\text{Cos}[c+d\,x])\right)+\frac{2\,A\,\text{Tan}[c+d\,x]}{a^3}\right)$$

- **Problem 1155: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{\text{Cos}[c+d\,x]^{5/2}\,(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 620 leaves, 6 steps):

$$-\frac{1}{3 a^5 \sqrt{a+b}\,\left(a^2-b^2\right) d} 2 \left(16 A b^5-3 a^5 B+15 a^3 b^2 B-8 a b^4 B-2 a^2 b^3 (14 A-C)+a^4 (8 A b-6 b C)\right)$$

$$\text{Cot}[c+d x]\, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{1}{3 a^4 \sqrt{a+b}\,\left(a^2-b^2\right) d} 2 \left(16 A b^4+4 a b^3 (3 A-2 B)-3 a^3 b (3 A-3 B-C)-2 a^2 b^2 (8 A+3 B-C)-a^4 (A-3 B+3 C)\right)$$

$$\text{Cot}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\, \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$

$$\frac{2 \left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d \,\text{Cos}[c+d x]^{3/2} (a+b \text{Cos}[c+d x])^{3/2}}+\frac{2 \left(10 a^2 A b^2-6 A b^4-7 a^3 b B+3 a b^3 B+4 a^4 C\right) \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \,\text{Cos}[c+d x]^{3/2} \sqrt{a+b \text{Cos}[c+d x]}}+$$

$$\frac{2 \left(8 A b^4+8 a^3 b B-4 a b^3 B+a^4 (A-5 C)-a^2 b^2 (13 A-C)\right) \sqrt{a+b \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{3 a^3 \left(a^2-b^2\right)^2 d \,\text{Cos}[c+d x]^{3/2}}$$

Result (type 4, 1601 leaves):

$$\frac{1}{3 a^4 (a-b)^2 (a+b)^2 d}$$

$$\Bigg(-\Bigg(4 a \left(a^6 A+15 a^4 A b^2-32 a^2 A b^4+16 A b^6-9 a^5 b B+17 a^3 b^3 B-8 a b^5 B+3 a^6 C-5 a^4 b^2 C+2 a^2 b^4 C\right) \sqrt{\frac{(a+b) \text{Cot}\left[\frac{1}{2} (c+d x)\right]^2}{-a+b}}$$

$$\sqrt{-\frac{(a+b) \text{Cos}[c+d x] \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}\, \text{Csc}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b \text{Cos}[c+d x]) \text{Csc}\left[\frac{1}{2} (c+d x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2 a}{-a+b}\right] \text{Sin}\left[\frac{1}{2} (c+d x)\right]^4\Bigg) \Big/ \left((a+b) \sqrt{\text{Cos}[c+d x]}\, \sqrt{a+b \text{Cos}[c+d x]}\right)-$$

$$4 a \left(8 a^5 A b-28 a^3 A b^3+16 a A b^5-3 a^6 B+15 a^4 b^2 B-8 a^2 b^4 B-6 a^5 b C+2 a^3 b^3 C\right)$$

$$\Bigg(\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\Bigg(\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[-\frac{a}{b},\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left(b\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)\Bigg)+$$

$$2\,\left(8\,a^4\,A\,b^2-28\,a^2\,A\,b^4+16\,A\,b^6-3\,a^5\,b\,B+15\,a^3\,b^3\,B-8\,a\,b^5\,B-6\,a^4\,b^2\,C+2\,a^2\,b^4\,C\right)$$

$$\Bigg(\frac{i\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\frac{\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{2\,a}{-a-b}\right]\,\text{Sec}[c+d\,x]}{b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]}{a+b}}}+$$

$$\frac{1}{b}\,2\,a\,\Bigg(\Bigg(a\,\sqrt{\frac{(a+b)\,\text{Cot}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{-a+b}}\,\sqrt{-\frac{(a+b)\,\text{Cos}[c+d\,x]\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Csc}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^4\Bigg)\Big/\left((a+b)\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\right)-$$

$$\left(a\sqrt{\frac{(a+b)\,\mathrm{Cot}\left[\frac{1}{2}(c+d\,x)\right]^2}{-a+b}}\sqrt{-\frac{(a+b)\,\mathrm{Cos}[c+d\,x]\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}\ \mathrm{Csc}[c+d\,x]\right.$$

$$\left.\mathrm{EllipticPi}\left[-\frac{a}{b},\mathrm{ArcSin}\left[\frac{\sqrt{\frac{(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}\left[\frac{1}{2}(c+d\,x)\right]^2}{a}}}{\sqrt{2}}\right],-\frac{2\,a}{-a+b}\right]\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\Big/\left(b\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\right)+$$

$$\left.\left.\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\ \mathrm{Sin}[c+d\,x]}{b\sqrt{\mathrm{Cos}[c+d\,x]}}\right)\right)+\frac{1}{d}\sqrt{\mathrm{Cos}[c+d\,x]}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}$$

$$\left(\frac{2\,\mathrm{Sec}[c+d\,x]\,(-8\,A\,b\,\mathrm{Sin}[c+d\,x]+3\,a\,B\,\mathrm{Sin}[c+d\,x])}{3\,a^4}+\frac{2\left(A\,b^4\,\mathrm{Sin}[c+d\,x]-a\,b^3\,B\,\mathrm{Sin}[c+d\,x]+a^2\,b^2\,C\,\mathrm{Sin}[c+d\,x]\right)}{3\,a^3\left(a^2-b^2\right)(a+b\,\mathrm{Cos}[c+d\,x])^2}+\right.$$

$$\left(2\left(12\,a^2\,A\,b^4\,\mathrm{Sin}[c+d\,x]-8\,A\,b^6\,\mathrm{Sin}[c+d\,x]-9\,a^3\,b^3\,B\,\mathrm{Sin}[c+d\,x]+5\,a\,b^5\,B\,\mathrm{Sin}[c+d\,x]+6\,a^4\,b^2\,C\,\mathrm{Sin}[c+d\,x]-2\,a^2\,b^4\,C\,\mathrm{Sin}[c+d\,x]\right)\right)\Big/$$

$$\left.\left(3\,a^4\left(a^2-b^2\right)^2(a+b\,\mathrm{Cos}[c+d\,x])\right)+\frac{2\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]}{3\,a^3}\right)$$

- **Problem 1156: Result more than twice size of optimal antiderivative.**

$$\int \mathrm{Cos}[c+d\,x]^m\,(a+b\,\mathrm{Cos}[c+d\,x])^2\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)dx$$

Optimal (type 5, 367 leaves, 6 steps) :

$$\frac{\left(2 a^2 C+b^2 C (3+m)+A b^2 (4+m)+2 a b B (4+m)\right) \text{Cos}[c+d x]^{1+m} \text{Sin}[c+d x]}{d (2+m) (4+m)}+$$

$$\frac{b (2 a C+b B (4+m)) \text{Cos}[c+d x]^{2+m} \text{Sin}[c+d x]}{d (3+m) (4+m)}+\frac{C \text{Cos}[c+d x]^{1+m} (a+b \text{Cos}[c+d x])^2 \text{Sin}[c+d x]}{d (4+m)}-$$

$$\left(\left(2 a b B \left(4+5 m+m^2\right)+a^2 (4+m) (C (1+m)+A (2+m))+b^2 (1+m) (C (3+m)+A (4+m))\right) \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]\right)\Big/\left(d (1+m) (2+m) (4+m) \sqrt{\text{Sin}[c+d x]^2}\right)-$$

$$\left(\left(b^2 B (2+m)+a^2 B (3+m)+2 a b (C (2+m)+A (3+m))\right) \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]\right)\Big/\left(d (2+m) (3+m) \sqrt{\text{Sin}[c+d x]^2}\right)$$

Result (type 5, 1677 leaves) :

$$-\frac{b^2 C \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[-\frac{3}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^5}{8 d (1+m) \left(\text{Sin}[c+d x]^2\right)^{5/2}}+$$

$$\frac{A b^2 \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{2 d (1+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}+$$

$$\frac{a b B \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{d (1+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}+$$

$$\frac{a^2 C \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{2 d (1+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}+$$

$$\frac{b^2 C \text{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{2 d (1+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}+$$

$$\frac{3 b^2 B \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{4 d (2+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}+$$

$$\frac{3 a b C \text{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{2 d (2+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}+$$

$$\frac{3 b^2 C \text{Cos}[c+d x]^{3+m} \text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\text{Cos}[c+d x]^2\right] \text{Sin}[c+d x]^3}{4 d (3+m) \left(\text{Sin}[c+d x]^2\right)^{3/2}}-$$

$$\frac{a^2 A \operatorname{Cos}[c+d x]^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (1+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{A b^2 \operatorname{Cos}[c+d x]^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (1+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{a b B \operatorname{Cos}[c+d x]^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (1+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{a^2 C \operatorname{Cos}[c+d x]^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (1+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{3 b^2 C \operatorname{Cos}[c+d x]^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{8 d (1+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{2 a A b \operatorname{Cos}[c+d x]^{2+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (2+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{a^2 B \operatorname{Cos}[c+d x]^{2+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (2+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{3 b^2 B \operatorname{Cos}[c+d x]^{2+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{4 d (2+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{3 a b C \operatorname{Cos}[c+d x]^{2+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (2+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{A b^2 \operatorname{Cos}[c+d x]^{3+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3+m}{2}, \frac{5+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (3+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{a b B \operatorname{Cos}[c+d x]^{3+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3+m}{2}, \frac{5+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{d (3+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{a^2 C \operatorname{Cos}[c+d x]^{3+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3+m}{2}, \frac{5+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (3+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{b^2 C \operatorname{Cos}[c+d x]^{3+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3+m}{2}, \frac{5+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (3+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{b^2 B \operatorname{Cos}[c+d x]^{4+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{4+m}{2}, \frac{6+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{4 d (4+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{a b C \operatorname{Cos}[c+d x]^{4+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{4+m}{2}, \frac{6+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{2 d (4+m) \sqrt{\operatorname{Sin}[c+d x]^2}} -$$

$$\frac{b^2 C \operatorname{Cos}[c+d x]^{5+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{5+m}{2}, \frac{7+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]}{8 d (5+m) \sqrt{\operatorname{Sin}[c+d x]^2}}$$

- **Problem 1157: Result more than twice size of optimal antiderivative.**

$$\int \operatorname{Cos}[c+d x]^m (a+b \operatorname{Cos}[c+d x]) \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) dx$$

Optimal (type 5, 235 leaves, 5 steps):

$$\frac{(b B+a C) \operatorname{Cos}[c+d x]^{1+m} \operatorname{Sin}[c+d x]}{d (2+m)}+\frac{b C \operatorname{Cos}[c+d x]^{2+m} \operatorname{Sin}[c+d x]}{d (3+m)}-$$

$$\left(((b B+a C) (1+m)+a A (2+m)) \operatorname{Cos}[c+d x]^{1+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]\right) \Big/$$

$$\left(d (1+m) (2+m) \sqrt{\operatorname{Sin}[c+d x]^2}\right) -$$

$$\left((b C (2+m)+A b (3+m)+a B (3+m)) \operatorname{Cos}[c+d x]^{2+m} \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, \operatorname{Cos}[c+d x]^2\right] \operatorname{Sin}[c+d x]\right) \Big/$$

$$\left(d (2+m) (3+m) \sqrt{\operatorname{Sin}[c+d x]^2}\right)$$

Result (type 5, 474 leaves):

$$\frac{1}{4\,d}\text{Cos}[c+d\,x]^{1+m}\,\text{Csc}[c+d\,x]\left(\frac{2\,(b\,B+a\,C)\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right]}{1+m}+\frac{3\,b\,C\,\text{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[-\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right]}{2+m}-\frac{4\,a\,A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right]}{1+m}-\frac{2\,b\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right]}{1+m}-\frac{2\,a\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right]}{1+m}-\frac{4\,A\,b\,\text{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right]}{2+m}-\frac{4\,a\,B\,\text{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right]}{2+m}-\frac{3\,b\,C\,\text{Cos}[c+d\,x]\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right]}{2+m}-\frac{2\,b\,B\,\text{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\text{Cos}[c+d\,x]^2\right]}{3+m}-\frac{2\,a\,C\,\text{Cos}[c+d\,x]^2\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3+m}{2},\frac{5+m}{2},\text{Cos}[c+d\,x]^2\right]}{3+m}-\frac{b\,C\,\text{Cos}[c+d\,x]^3\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{4+m}{2},\frac{6+m}{2},\text{Cos}[c+d\,x]^2\right]}{4+m}\right)\sqrt{\text{Sin}[c+d\,x]^2}$$

- **Problem 1158: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 6, 372 leaves, 8 steps):

$$\frac{1}{b^2\,(a^2-b^2)\,d}a\,\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{AppellF1}\left[\frac{1}{2},\frac{1-m}{2},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Cos}[c+d\,x]^{-1+m}\,\left(\text{Cos}[c+d\,x]^2\right)^{\frac{1-m}{2}}\,\text{Sin}[c+d\,x]-\frac{1}{b\,(a^2-b^2)\,d}\left(A\,b^2-a\,(b\,B-a\,C)\right)\,\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Cos}[c+d\,x]^m\,\left(\text{Cos}[c+d\,x]^2\right)^{-m/2}\,\text{Sin}[c+d\,x]-\frac{(b\,B-a\,C)\,\text{Cos}[c+d\,x]^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{b^2\,d\,(1+m)\,\sqrt{\text{Sin}[c+d\,x]^2}}-\frac{C\,\text{Cos}[c+d\,x]^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right]\,\text{Sin}[c+d\,x]}{b\,d\,(2+m)\,\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 16 153 leaves):

$$\left(\left(\frac{A\,\text{Cos}[c+d\,x]^m}{a+b\,\text{Cos}[c+d\,x]}+\frac{C\,\text{Cos}[c+d\,x]^m}{2\,(a+b\,\text{Cos}[c+d\,x])}+\frac{B\,\text{Cos}[c+d\,x]^{1+m}}{a+b\,\text{Cos}[c+d\,x]}+\frac{C\,\text{Cos}[c+d\,x]^m\,\text{Cos}[2\,(c+d\,x)]}{2\,(a+b\,\text{Cos}[c+d\,x])}\right)\right.$$

$$\left(\frac{A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Tan}[c+d\,x]}{b}-\frac{a\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Tan}[c+d\,x]}{b^2}+\right.$$

$$\frac{a^2\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Tan}[c+d\,x]}{b^3}+\frac{B\,\text{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Tan}[c+d\,x]}{b}-$$

$$\frac{a\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Tan}[c+d\,x]}{b^2}+\frac{C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Tan}[c+d\,x]}{b}+$$

$$\left(3\,a^2\,A\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b\left(-3\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.(a^2-b^2)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)-$$

$$\left(3\,a^3\,(a^2-b^2)\,B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^2\left(-3\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.(a^2-b^2)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$

$$\left(3\,a^4\,(a^2-b^2)\,C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^3\left(-3\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.(a^2-b^2)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)-$$

$$\left(3\,a\,A\,(a^2-b^2)\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Tan}[c+d\,x]\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)+$$
$$\left(3a^2\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,\frac{a^2\,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\text{Tan}[c+d x]\left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right)\Big/$$
$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)\right)-$$
$$\left(3a^3\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,\frac{a^2\,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\text{Tan}[c+d x]\left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right)\Big/$$
$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$
$$\left(2a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.$$
$$\left.\left.\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)\right)\right)\Big/$$
$$\left(d\left(\frac{A\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d x]^2\right]\text{Sec}[c+d x]^2}{b}-\frac{a\,B\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d x]^2\right]\text{Sec}[c+d x]^2}{b^2}+\right.\right.$$
$$\frac{a^2\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d x]^2\right]\text{Sec}[c+d x]^2}{b^3}+$$
$$\frac{B\,\text{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d x]^2\right]\text{Sec}[c+d x]^2}{b}-$$
$$\frac{a\,C\,\text{Hypergeometric2F1}\left[\frac{1}{2},1+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d x]^2\right]\text{Sec}[c+d x]^2}{b^2}+$$

$$\frac{C\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{3}{2}+\frac{m}{2},\frac{3}{2},-\text{Tan}[c+d\,x]^2\right]\text{Sec}[c+d\,x]^2}{b}-$$

$$\left(6\,a^4\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)+$$

$$\left(6\,a^5\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)-$$

$$\left(6\,a^6\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^3\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\right)+$$

$$\left(6\,a^3\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2-$$

$$\Big(6\,a^4\,(a^2-b^2)\,B\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Big)\Big/$$

$$\Big(b\,\Big(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Big)+$$

$$\Big(6\,a^5\,(a^2-b^2)\,C\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Big)\Big/$$

$$\Big(b^2\,\Big(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{m}{2},\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{2+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)^2\Big)+$$

$$\Big(6\,a^2\,A\,(a^2-b^2)\,\left(\frac{1}{2}-\frac{m}{2}\right)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2$$

$$\left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\Big)\Big/\,\Big(b\,\Big(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Big)-$$

$$\Big(6\,a^3\,(a^2-b^2)\,B\,\left(\frac{1}{2}-\frac{m}{2}\right)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2$$

$$\left(1+\text{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\Big)\Big/\,\Big(b^2\,\Big(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Big(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,(-1+m)\,\text{AppellF1}\Big[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Big)\,\text{Tan}[c+d\,x]^2\Big)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Big)+$$

$$\Big(6\,a^4\,(a^2-b^2)\,C\,\left(\frac{1}{2}-\frac{m}{2}\right)\,\text{AppellF1}\Big[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2$$

$$\left(1+\operatorname{Tan}[c+d\,x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\Bigg)\Bigg/\Bigg(b^3\left(-3\left(a^2-b^2\right)\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left(2\,a^2\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)(-1+m)\operatorname{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\operatorname{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)\right)\Bigg)+$$

$$\left(3\,a^2\,A\left(a^2-b^2\right)\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,\frac{a^2\operatorname{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\operatorname{Sec}[c+d\,x]^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Bigg/$$

$$\Bigg(b\left(-3\left(a^2-b^2\right)\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left(2\,a^2\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)(-1+m)\operatorname{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\operatorname{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)\right)\Bigg)-$$

$$\left(3\,a^3\left(a^2-b^2\right)B\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,\frac{a^2\operatorname{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\operatorname{Sec}[c+d\,x]^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Bigg/$$

$$\Bigg(b^2\left(-3\left(a^2-b^2\right)\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left(2\,a^2\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)(-1+m)\operatorname{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\operatorname{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)\right)\Bigg)+$$

$$\left(3\,a^4\left(a^2-b^2\right)C\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,\frac{a^2\operatorname{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\operatorname{Sec}[c+d\,x]^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Bigg/$$

$$\Bigg(b^3\left(-3\left(a^2-b^2\right)\operatorname{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left(2\,a^2\operatorname{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right)(-1+m)\operatorname{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,-\frac{a^2\operatorname{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\operatorname{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\operatorname{Tan}[c+d\,x]^2\right)\right)\Bigg)+$$

$$\Bigg(3\,a^2\,A\left(a^2-b^2\right)\operatorname{Tan}[c+d\,x]\left(-\frac{3}{3}(-1+m)\operatorname{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),1,\frac{5}{2},-\operatorname{Tan}[c+d\,x]^2,\frac{a^2\operatorname{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\operatorname{Sec}[c+d\,x]^2\operatorname{Tan}[c+d\,x]+\right.$$

$$\left.\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,\left(-a^2+b^2\right)}\right)\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)-$$

$$\left(3\,a^3\,\left(a^2-b^2\right)\,B\,\text{Tan}[c+d\,x]\,\left(-\frac{1}{3}\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{1}{2}\,(-1+m),\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\right.\right.$$

$$\left.\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,\left(-a^2+b^2\right)}\right)\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^2\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$

$$\left(3\,a^4\,\left(a^2-b^2\right)\,C\,\text{Tan}[c+d\,x]\,\left(-\frac{1}{3}\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,1+\frac{1}{2}\,(-1+m),\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\right.\right.$$

$$\left.\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\,\left(-a^2+b^2\right)}\right)\,\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\right)\Big/$$

$$\left(b^3\,\left(-3\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{2},\,\frac{1}{2}\,(-1+m),\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1}{2}\,(-1+m),\,2,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)\,(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\,\frac{1+m}{2},\,1,\,\frac{5}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\,\text{Tan}[c+d\,x]^2\right)\,\left(-b^2+a^2\,\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$

$$\left(3\,a\,A\,\left(a^2-b^2\right)\,m\,\text{AppellF1}\left[\frac{1}{2},\,\frac{m}{2},\,1,\,\frac{3}{2},\,-\text{Tan}[c+d\,x]^2,\,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\left(1+\text{Tan}[c+d\,x]^2\right)^{-1-\frac{m}{2}}\right)\Big/$$

$$\Bigg(\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\Big(-b^2+a^2\,\big(1+\text{Tan}[c+d\,x]^2\big)\Big)\Bigg)-$$

$$\Bigg(3\,a^2\,(a^2-b^2)\,B\,m\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\big(1+\text{Tan}[c+d\,x]^2\big)^{-1-\frac{m}{2}}\Bigg)\Big/$$

$$\Bigg(b\,\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\Big(-b^2+a^2\,\big(1+\text{Tan}[c+d\,x]^2\big)\Big)\Bigg)+$$

$$\Bigg(3\,a^3\,(a^2-b^2)\,C\,m\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]^2\,\big(1+\text{Tan}[c+d\,x]^2\big)^{-1-\frac{m}{2}}\Bigg)\Big/$$

$$\Bigg(b^2\,\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\Big(-b^2+a^2\,\big(1+\text{Tan}[c+d\,x]^2\big)\Big)\Bigg)-$$

$$\Bigg(3\,a\,A\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\big(1+\text{Tan}[c+d\,x]^2\big)^{-m/2}\Bigg)\Big/$$

$$\Bigg(\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\Bigg(2\,a^2\,\text{AppellF1}\Big[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$(a^2-b^2)\,m\,\text{AppellF1}\Big[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]\Bigg)\,\text{Tan}[c+d\,x]^2\Bigg)\,\Big(-b^2+a^2\,\big(1+\text{Tan}[c+d\,x]^2\big)\Big)\Bigg)+$$

$$\Bigg(3\,a^2\,(a^2-b^2)\,B\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sec}[c+d\,x]^2\,\big(1+\text{Tan}[c+d\,x]^2\big)^{-m/2}\Bigg)\Big/$$

$$\Bigg(b\,\Bigg(-3\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\Big]+$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Big)-$$

$$\left(3\,a^3\left(a^2-b^2\right)C\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)-$$

$$\left(3\,a\,A\left(a^2-b^2\right)\text{Tan}[c+d\,x]\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left.\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)+$$

$$\left(3\,a^2\left(a^2-b^2\right)B\,\text{Tan}[c+d\,x]\left(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]+\right.\right.$$

$$\left.\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(-a^2+b^2\right)}\right)\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.$$

$$\left.\left.\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right) \left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\right) -$$

$$\left(3 a^3 \left(a^2-b^2\right) C \,\text{Tan}[c+d x] \left(-\frac{1}{3} m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] + \right.\right.$$

$$\left.\left.\frac{2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 \left(-a^2+b^2\right)}\right) \left(1+\text{Tan}[c+d x]^2\right)^{-m/2}\right) \Big/$$

$$\left(b^2 \left(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, \right.\right.\right.\right.$$

$$\left.\left.-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Tan}[c+d x]^2\right)$$

$$\left.\left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\right) + \frac{C \,\text{Sec}[c+d x]^2 \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{3}{2}+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] + \left(1+\text{Tan}[c+d x]^2\right)^{-\frac{3}{2}-\frac{m}{2}}\right)}{b} +$$

$$\frac{B \,\text{Sec}[c+d x]^2 \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, 1+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] + \left(1+\text{Tan}[c+d x]^2\right)^{-1-\frac{m}{2}}\right)}{b} -$$

$$\frac{a C \,\text{Sec}[c+d x]^2 \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, 1+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] + \left(1+\text{Tan}[c+d x]^2\right)^{-1-\frac{m}{2}}\right)}{b^2} +$$

$$\frac{A \,\text{Sec}[c+d x]^2 \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{2}+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] + \left(1+\text{Tan}[c+d x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)}{b} -$$

$$\frac{a B \,\text{Sec}[c+d x]^2 \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{2}+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] + \left(1+\text{Tan}[c+d x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)}{b^2} +$$

$$\frac{a^2 C \,\text{Sec}[c+d x]^2 \left(-\text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1}{2}+\frac{m}{2}, \frac{3}{2}, -\text{Tan}[c+d x]^2\right] + \left(1+\text{Tan}[c+d x]^2\right)^{-\frac{1}{2}-\frac{m}{2}}\right)}{b^3} -$$

$$\left(3 a^2 A \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{1}{2} (-1+m), 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Tan}[c+d x]\right.$$

$$\left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}} \left(2 \left(2 a^2 \text{AppellF1}\left[\frac{3}{2}, \frac{1}{2} (-1+m), 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \right.\right.$$

$$\left.\left(a^2-b^2\right) (-1+m) \text{AppellF1}\left[\frac{3}{2}, \frac{1+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\right) \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\text{Tan}[c+d x]^2\left(2\,a^2\left(-\frac{3}{5}(-1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1+m),2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1+m),3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},1,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)\right)\right)\right)\Big/$$

$$\left(b\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,\right.\right.\right.\right.$$

$$\left.\left.\left.-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d x]^2\right)^2$$

$$\left.\left(-b^2+a^2\left(1+\text{Tan}[c+d x]^2\right)\right)\right)+\left(3\,a^3\left(a^2-b^2\right)\text{B}\,\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d x]^2,\frac{a^2\,\text{Tan}[c+d x]^2}{-a^2+b^2}\right]\right.$$

$$\text{Tan}[c+d x]\left(1+\text{Tan}[c+d x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),1,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\text{Tan}[c+d x]^2\left(2\,a^2\left(-\frac{3}{5}(-1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1+m),2,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1+m),3,\frac{7}{2},-\text{Tan}[c+d x]^2,-\frac{a^2\,\text{Tan}[c+d x]^2}{a^2-b^2}\right]\text{Sec}[c+d x]^2\,\text{Tan}[c+d x]\right)+$$

$$\left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)^2$$

$$\left.\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)-\left(3\,a^4\left(a^2-b^2\right)\text{C AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\right.$$

$$\text{Tan}[c+d\,x]\left(1+\text{Tan}[c+d\,x]^2\right)^{\frac{1}{2}-\frac{m}{2}}\left(2\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\right.\right.$$

$$\left.\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\left(a^2-b^2\right)\left(-\frac{1}{3}(-1+m)\,\text{AppellF1}\left[\frac{3}{2},1+\frac{1}{2}(-1+m),1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\frac{1}{3\left(a^2-b^2\right)}2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{3}{5}(-1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1}{2}(-1+m),2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{1}{5\left(a^2-b^2\right)}12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1}{2}(-1+m),3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)+$$

$$\left(a^2-b^2\right)(-1+m)\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{1+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\left.\frac{3}{5}(1+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{1+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\right)\Big/$$

$$\left(b^3\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{1}{2}(-1+m),1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{1}{2}(-1+m),2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.\right.\right.\right.$$

$$\left.\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)(-1+m)\,\text{AppellF1}\left[\frac{3}{2},\frac{1+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\Big)^2$$

$$\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)+\Bigg(3\,a\,A\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Tan}[c+d\,x]$$

$$\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Bigg(2\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$3\left(a^2-b^2\right)\Bigg(-\frac{1}{3}m\,\text{AppellF1}\left[\frac{3}{2},1+\frac{m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\Bigg)+$$

$$\text{Tan}[c+d\,x]^2\Bigg(2\,a^2\Bigg(-\frac{3}{5}m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\left(a^2-b^2\right)}\Bigg)+$$

$$\left(a^2-b^2\right)m\Bigg(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-$$

$$\frac{3}{5}(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\Bigg)\Bigg)\Bigg)\Bigg)\Bigg/$$

$$\Bigg(\Bigg(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,\right.$$

$$\left.-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\Bigg)\text{Tan}[c+d\,x]^2\Bigg)^2$$

$$\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\Bigg)-\Bigg(3\,a^2\left(a^2-b^2\right)B\,\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,\frac{a^2\,\text{Tan}[c+d\,x]^2}{-a^2+b^2}\right]\text{Tan}[c+d\,x]$$

$$\left(1+\text{Tan}[c+d\,x]^2\right)^{-m/2}\Bigg(2\Bigg(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+$$

$$\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\Bigg) \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$3 \left(a^2-b^2\right) \Bigg(-\frac{1}{3} m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\frac{2 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{3 \left(a^2-b^2\right)}\Bigg) +$$

$$\text{Tan}[c+d x]^2 \Bigg(2 a^2 \Bigg(-\frac{3}{5} m \,\text{AppellF1}\left[\frac{5}{2}, 1+\frac{m}{2}, 2, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\frac{12 a^2 \,\text{AppellF1}\left[\frac{5}{2}, \frac{m}{2}, 3, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]}{5 \left(a^2-b^2\right)}\Bigg) +$$

$$\left(a^2-b^2\right) m \Bigg(-\frac{1}{5 \left(a^2-b^2\right)} 6 a^2 \,\text{AppellF1}\left[\frac{5}{2}, \frac{2+m}{2}, 2, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\frac{3}{5} (2+m) \,\text{AppellF1}\left[\frac{5}{2}, 1+\frac{2+m}{2}, 1, \frac{7}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x]\Bigg)\Bigg)\Bigg)\Bigg) \Bigg/$$

$$\Bigg(b \Bigg(-3 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \Bigg(2 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2,\right.$$

$$\left.-\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] + \left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\Bigg) \text{Tan}[c+d x]^2\Bigg)^2$$

$$\left(-b^2+a^2 \left(1+\text{Tan}[c+d x]^2\right)\right)\Bigg) + \Bigg(3 a^3 \left(a^2-b^2\right) C \,\text{AppellF1}\left[\frac{1}{2}, \frac{m}{2}, 1, \frac{3}{2}, -\text{Tan}[c+d x]^2, \frac{a^2 \text{Tan}[c+d x]^2}{-a^2+b^2}\right] \text{Tan}[c+d x]$$

$$\left(1+\text{Tan}[c+d x]^2\right)^{-m/2} \Bigg(2 \Bigg(2 a^2 \,\text{AppellF1}\left[\frac{3}{2}, \frac{m}{2}, 2, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] +$$

$$\left(a^2-b^2\right) m \,\text{AppellF1}\left[\frac{3}{2}, \frac{2+m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right]\Bigg) \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$3 \left(a^2-b^2\right) \Bigg(-\frac{1}{3} m \,\text{AppellF1}\left[\frac{3}{2}, 1+\frac{m}{2}, 1, \frac{5}{2}, -\text{Tan}[c+d x]^2, -\frac{a^2 \text{Tan}[c+d x]^2}{a^2-b^2}\right] \text{Sec}[c+d x]^2 \text{Tan}[c+d x] -$$

$$\left.\frac{2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{3\left(a^2-b^2\right)}\right)+$$

$$\text{Tan}[c+d\,x]^2\left(2\,a^2\left(-\frac{3}{5}\,m\,\text{AppellF1}\left[\frac{5}{2},1+\frac{m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.\right.$$

$$\left.\frac{12\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{m}{2},3,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]}{5\left(a^2-b^2\right)}\right)+$$

$$\left(a^2-b^2\right)m\left(-\frac{1}{5\left(a^2-b^2\right)}6\,a^2\,\text{AppellF1}\left[\frac{5}{2},\frac{2+m}{2},2,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]-\right.$$

$$\left.\left.\left.\left.\frac{3}{5}\,(2+m)\,\text{AppellF1}\left[\frac{5}{2},1+\frac{2+m}{2},1,\frac{7}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\text{Sec}[c+d\,x]^2\,\text{Tan}[c+d\,x]\right)\right)\right)\right)\Big/$$

$$\left(b^2\left(-3\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{2},\frac{m}{2},1,\frac{3}{2},-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(2\,a^2\,\text{AppellF1}\left[\frac{3}{2},\frac{m}{2},2,\frac{5}{2},\right.\right.\right.\right.$$

$$-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]+\left(a^2-b^2\right)m\,\text{AppellF1}\left[\frac{3}{2},\frac{2+m}{2},1,\frac{5}{2},\right.$$

$$\left.\left.\left.\left.-\text{Tan}[c+d\,x]^2,-\frac{a^2\,\text{Tan}[c+d\,x]^2}{a^2-b^2}\right]\right)\text{Tan}[c+d\,x]^2\right)^2\left(-b^2+a^2\left(1+\text{Tan}[c+d\,x]^2\right)\right)\right)\right)$$

- **Problem 1159: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Cos}[c+d\,x]^m\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{(a+b\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 6, 564 leaves, 9 steps) :

$$\frac{1}{b^2\left(a^2-b^2\right)^2 d}\left(A\,b^4\,m+a^3\,b\,B\,m-a\,b^3\,B\,(1+m)-a^4\,C\,(1+m)+a^2\,b^2\,(A-A\,m+C\,(2+m))\right)$$
$$\text{AppellF1}\left[\frac{1}{2},\frac{1-m}{2},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]\text{Cos}[c+d\,x]^{-1+m}\left(\text{Cos}[c+d\,x]^2\right)^{\frac{1-m}{2}}\text{Sin}[c+d\,x]-\frac{1}{a\,b\left(a^2-b^2\right)^2 d}$$
$$\left(A\,b^4\,m+a^3\,b\,B\,m-a\,b^3\,B\,(1+m)-a^4\,C\,(1+m)+a^2\,b^2\,(A-A\,m+C\,(2+m))\right)\text{AppellF1}\left[\frac{1}{2},-\frac{m}{2},1,\frac{3}{2},\text{Sin}[c+d\,x]^2,-\frac{b^2\,\text{Sin}[c+d\,x]^2}{a^2-b^2}\right]$$
$$\text{Cos}[c+d\,x]^m\left(\text{Cos}[c+d\,x]^2\right)^{-m/2}\text{Sin}[c+d\,x]+\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Cos}[c+d\,x]^{1+m}\,\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\,(a+b\,\text{Cos}[c+d\,x])}+$$
$$\left(\left(a\,b\,B\,m-a^2\,C\,(1+m)+b^2\,(C-A\,m)\right)\text{Cos}[c+d\,x]^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]\right)\Big/$$
$$\left(b^2\left(a^2-b^2\right)d\,(1+m)\sqrt{\text{Sin}[c+d\,x]^2}\right)+\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)(1+m)\,\text{Cos}[c+d\,x]^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},\text{Cos}[c+d\,x]^2\right]\text{Sin}[c+d\,x]}{a\,b\left(a^2-b^2\right)d\,(2+m)\sqrt{\text{Sin}[c+d\,x]^2}}$$

Result (type 6, 25 777 leaves) : Display of huge result suppressed !

- **Problem 1160: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 205 leaves, 8 steps) :

$$-\frac{2\,a\,(3\,A+5\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+$$
$$\frac{2\,a\,(5\,A+7\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a\,(3\,A+5\,C)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d}+$$
$$\frac{2\,a\,(5\,A+7\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{21\,d}+\frac{2\,a\,A\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a\,A\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 573 leaves) :

$$a\left(-\frac{1}{5\sqrt{2}\,d}3\,A\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,(1+\mathrm{Cos}[c+dx])\,\mathrm{Csc}[c]\right.$$

$$\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2-\frac{1}{\sqrt{2}\,d}$$

$$C\,e^{-i(2c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,(1+\mathrm{Cos}[c+dx])\,\mathrm{Csc}[c]\left(1+e^{2i(c+dx)}+\left(-1+e^{2ic}\right)\sqrt{1+e^{2i(c+dx)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2i(c+dx)}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2+\frac{5\,A\sqrt{\mathrm{Cos}[c+dx]}\,(1+\mathrm{Cos}[c+dx])\,\mathrm{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\sqrt{\mathrm{Sec}[c+dx]}}{21\,d}+$$

$$\frac{C\sqrt{\mathrm{Cos}[c+dx]}\,(1+\mathrm{Cos}[c+dx])\,\mathrm{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\sqrt{\mathrm{Sec}[c+dx]}}{3\,d}+$$

$$(1+\mathrm{Cos}[c+dx])\,\mathrm{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\sqrt{\mathrm{Sec}[c+dx]}\left(\frac{(3A+5C)\,\mathrm{Cos}[dx]\,\mathrm{Csc}[c]}{5\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+dx]^3\,\mathrm{Sin}[dx]}{7\,d}+\right.$$

$$\left.\left.\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+dx]^2\,(5\,A\,\mathrm{Sin}[c]+7\,A\,\mathrm{Sin}[dx])}{35\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+dx]\,(21\,A\,\mathrm{Sin}[c]+25\,A\,\mathrm{Sin}[dx]+35\,C\,\mathrm{Sin}[dx])}{105\,d}+\frac{(5A+7C)\,\mathrm{Tan}[c]}{21\,d}\right)\right)$$

- **Problem 1161: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\mathrm{Cos}[c+dx])\left(A+C\,\mathrm{Cos}[c+dx]^2\right)\mathrm{Sec}[c+dx]^{7/2}\,dx$$

Optimal (type 4, 172 leaves, 7 steps) :

$$-\frac{2a(3A+5C)\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\mathrm{Sec}[c+dx]}}{5\,d}+\frac{2a(A+3C)\sqrt{\mathrm{Cos}[c+dx]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+dx),2\right]\sqrt{\mathrm{Sec}[c+dx]}}{3\,d}+$$

$$\frac{2a(3A+5C)\sqrt{\mathrm{Sec}[c+dx]}\,\mathrm{Sin}[c+dx]}{5\,d}+\frac{2\,a\,A\,\mathrm{Sec}[c+dx]^{3/2}\,\mathrm{Sin}[c+dx]}{3\,d}+\frac{2\,a\,A\,\mathrm{Sec}[c+dx]^{5/2}\,\mathrm{Sin}[c+dx]}{5\,d}$$

Result (type 5, 273 leaves) :

$$\frac{1}{30\, d\, \left(1+e^{2\, i\, (c+d\, x)}\right)^2} a\, e^{-i\, (2\, c+d\, x)} \left(-1+e^{2\, i\, c}\right) (1+\text{Cos}[c+d\, x])\, \text{Csc}[c] \left(9\, A+15\, C+5\, A\, e^{i\, (c+d\, x)}+24\, A\, e^{2\, i\, (c+d\, x)}+30\, C\, e^{2\, i\, (c+d\, x)}+3\, A\, e^{4\, i\, (c+d\, x)}+15\, C\, e^{4\, i\, (c+d\, x)}-5\, A\, e^{5\, i\, (c+d\, x)}-5\, i\, (A+3\, C)\, e^{i\, (c+d\, x)} \left(1+e^{2\, i\, (c+d\, x)}\right)^2 \sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d\, x), 2\right]-3\, (3\, A+5\, C) \left(1+e^{2\, i\, (c+d\, x)}\right)^{5/2} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\, i\, (c+d\, x)}\right]\right) \text{Sec}\left[\frac{1}{2} (c+d\, x)\right]^2 \sqrt{\text{Sec}[c+d\, x]}$$

## Problem 1162: Result unnecessarily involves higher level functions.

$$\int (a+a\, \text{Cos}[c+d\, x]) \left(A+C\, \text{Cos}[c+d\, x]^2\right) \text{Sec}[c+d\, x]^{5/2}\, dx$$

Optimal (type 4, 135 leaves, 6 steps):

$$-\frac{2\, a\, (A-C) \sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{d}+\frac{2\, a\, (A+3\, C) \sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{3\, d}+\frac{2\, a\, A \sqrt{\text{Sec}[c+d\, x]}\, \text{Sin}[c+d\, x]}{d}+\frac{2\, a\, A\, \text{Sec}[c+d\, x]^{3/2}\, \text{Sin}[c+d\, x]}{3\, d}$$

Result (type 5, 193 leaves):

$$\frac{1}{3\, d} a\, e^{-i\, (2\, c+d\, x)}\, \text{Sec}[c+d\, x]^{3/2} \left(-3\, A+3\, C-3\, A\, \text{Cos}[2\, (c+d\, x)]+3\, C\, \text{Cos}[2\, (c+d\, x)]+2\, i\, (A+3\, C)\, \text{Cos}[c+d\, x]^{3/2}\, \text{EllipticF}\left[\frac{1}{2} (c+d\, x), 2\right]+3\, (A-C)\, e^{-2\, i\, (c+d\, x)} \left(1+e^{2\, i\, (c+d\, x)}\right)^{3/2} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2\, i\, (c+d\, x)}\right]+2\, i\, A\, \text{Sin}[c+d\, x]+3\, i\, A\, \text{Sin}[2\, (c+d\, x)]\right) (-i\, \text{Cos}[2\, c+d\, x]+\text{Sin}[2\, c+d\, x])$$

## Problem 1163: Result unnecessarily involves higher level functions.

$$\int (a+a\, \text{Cos}[c+d\, x]) \left(A+C\, \text{Cos}[c+d\, x]^2\right) \text{Sec}[c+d\, x]^{3/2}\, dx$$

Optimal (type 4, 135 leaves, 6 steps):

$$-\frac{2\, a\, (A-C) \sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{d}+\frac{2\, a\, (3\, A+C) \sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d\, x), 2\right] \sqrt{\text{Sec}[c+d\, x]}}{3\, d}+\frac{2\, a\, C\, \text{Sin}[c+d\, x]}{3\, d \sqrt{\text{Sec}[c+d\, x]}}+\frac{2\, a\, A \sqrt{\text{Sec}[c+d\, x]}\, \text{Sin}[c+d\, x]}{d}$$

Result (type 5, 184 leaves):

$$-\frac{1}{3\,d}a\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\text{Sec}[c+d\,x]}\,\Big(6\,i\,A\,\text{Cos}[c+d\,x]-6\,i\,C\,\text{Cos}[c+d\,x]+2\,(3\,A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\Big[\frac{1}{2}\,(c+d\,x),\,2\Big]-6\,i\,(A-C)\,e^{-i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\Big]+6\,A\,\text{Sin}[c+d\,x]+C\,\text{Sin}[2\,(c+d\,x)]\Big)\,(-\text{Cos}[2\,c+d\,x]-i\,\text{Sin}[2\,c+d\,x])$$

- **Problem 1164: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+d\,x])\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 141 leaves, 6 steps):

$$\frac{2\,a\,(5\,A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{2\,a\,(3\,A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+\frac{2\,a\,C\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,a\,C\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 183 leaves):

$$\frac{1}{30\,d}a\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\text{Sec}[c+d\,x]}\,\Big(20\,(3\,A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\Big[\frac{1}{2}\,(c+d\,x),\,2\Big]+12\,i\,(5\,A+3\,C)\,e^{-i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\Big[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\Big]+2\,\text{Cos}[c+d\,x]\,(-6\,i\,(5\,A+3\,C)+10\,C\,\text{Sin}[c+d\,x]+3\,C\,\text{Sin}[2\,(c+d\,x)])\Big)\,(\text{Cos}[2\,c+d\,x]+i\,\text{Sin}[2\,c+d\,x])$$

- **Problem 1165: Result unnecessarily involves higher level functions.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 174 leaves, 7 steps):

$$\frac{2\,a\,(5\,A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{2\,a\,(7\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a\,C\,\text{Sin}[c+d\,x]}{7\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{2\,a\,C\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,a\,(7\,A+5\,C)\,\text{Sin}[c+d\,x]}{21\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 202 leaves):

$$\frac{1}{420\, d} a\, e^{-i (2 c+d x)} \sqrt{\operatorname{Sec}[c+d x]} \left(40 (7 A+5 C) \sqrt{\operatorname{Cos}[c+d x]}\, \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]+168\, i (5 A+3 C)\, e^{-i (c+d x)} \sqrt{1+e^{2 i (c+d x)}}\, \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+ 2 \operatorname{Cos}[c+d x] (-84\, i (5 A+3 C)+5 (28 A+23 C) \operatorname{Sin}[c+d x]+42 C \operatorname{Sin}[2 (c+d x)]+15 C \operatorname{Sin}[3 (c+d x)])\right) (\operatorname{Cos}[2 c+d x]+i \operatorname{Sin}[2 c+d x])$$

- **Problem 1166: Result unnecessarily involves higher level functions.**

$$\int \frac{(a+a \operatorname{Cos}[c+d x]) \left(A+C \operatorname{Cos}[c+d x]^2\right)}{\operatorname{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 205 leaves, 8 steps):

$$\frac{2 a (9 A+7 C) \sqrt{\operatorname{Cos}[c+d x]}\, \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{15 d}+\frac{2 a (7 A+5 C) \sqrt{\operatorname{Cos}[c+d x]}\, \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{21 d}+\frac{2 a C \operatorname{Sin}[c+d x]}{9 d \operatorname{Sec}[c+d x]^{7/2}}+\frac{2 a C \operatorname{Sin}[c+d x]}{7 d \operatorname{Sec}[c+d x]^{5/2}}+\frac{2 a (9 A+7 C) \operatorname{Sin}[c+d x]}{45 d \operatorname{Sec}[c+d x]^{3/2}}+\frac{2 a (7 A+5 C) \operatorname{Sin}[c+d x]}{21 d \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 5, 184 leaves):

$$\frac{1}{2520\, d} a \sqrt{\operatorname{Sec}[c+d x]} \left(240 (7 A+5 C) \sqrt{\operatorname{Cos}[c+d x]}\, \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]+ 336\, i (9 A+7 C)\, e^{-i (c+d x)} \sqrt{1+e^{2 i (c+d x)}}\, \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]+2 \operatorname{Cos}[c+d x] (-1512\, i A-1176\, i C+30 (28 A+23 C) \operatorname{Sin}[c+d x]+14 (18 A+19 C) \operatorname{Sin}[2 (c+d x)]+90 C \operatorname{Sin}[3 (c+d x)]+35 C \operatorname{Sin}[4 (c+d x)])\right)$$

- **Problem 1167: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int (a+a \operatorname{Cos}[c+d x])^2 \left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^{11/2} \, dx$$

Optimal (type 4, 270 leaves, 10 steps):

$$-\frac{16 a^2 (2 A+3 C) \sqrt{\operatorname{Cos}[c+d x]}\, \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{15 d}+\frac{4 a^2 (5 A+7 C) \sqrt{\operatorname{Cos}[c+d x]}\, \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{21 d}+\frac{16 a^2 (2 A+3 C) \sqrt{\operatorname{Sec}[c+d x]}\, \operatorname{Sin}[c+d x]}{15 d}+\frac{4 a^2 (5 A+7 C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{21 d}+\frac{2 a^2 (19 A+21 C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{105 d}+\frac{8 A \left(a^2+a^2 \operatorname{Cos}[c+d x]\right) \operatorname{Sec}[c+d x]^{7/2} \operatorname{Sin}[c+d x]}{63 d}+\frac{2 A (a+a \operatorname{Cos}[c+d x])^2 \operatorname{Sec}[c+d x]^{9/2} \operatorname{Sin}[c+d x]}{9 d}$$

Result (type 5, 635 leaves) :

$$-\frac{1}{15\,d}4\,\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4-\frac{1}{5\,d}2\,\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$
$$(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4+$$
$$\frac{5\,A\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+$$
$$\frac{C\,\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}}{3\,d}+$$
$$(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}\left(\frac{4\,(2\,A+3\,C)\,\text{Cos}[d\,x]\,\text{Csc}[c]}{15\,d}+\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d\,x]^4\,\text{Sin}[d\,x]}{18\,d}+\right.$$
$$\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^3\,(7\,A\,\text{Sin}[c]+18\,A\,\text{Sin}[d\,x])}{126\,d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]^2\,(90\,A\,\text{Sin}[c]+112\,A\,\text{Sin}[d\,x]+63\,C\,\text{Sin}[d\,x])}{630\,d}+$$
$$\left.\frac{\text{Sec}[c]\,\text{Sec}[c+d\,x]\,(112\,A\,\text{Sin}[c]+63\,C\,\text{Sin}[c]+150\,A\,\text{Sin}[d\,x]+210\,C\,\text{Sin}[d\,x])}{630\,d}+\frac{(5\,A+7\,C)\,\text{Tan}[c]}{21\,d}\right)$$

- **Problem 1168: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^2\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 237 leaves, 9 steps) :

$$-\frac{4\,a^2\,(3\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{8\,a^2\,(3\,A+7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+$$
$$\frac{4\,a^2\,(3\,A+5\,C)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a^2\,(33\,A+35\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,d}+$$
$$\frac{8\,A\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 591 leaves) :

$$-\frac{1}{5\sqrt{2}\,d}3\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,Cos[c+d\,x])^2\,Csc[c]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,Hypergeometric2F1\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4-\frac{1}{\sqrt{2}\,d}$$

$$C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,Cos[c+d\,x])^2\,Csc[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,Hypergeometric2F1\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4+\frac{2\,A\sqrt{Cos[c+d\,x]}\,(a+a\,Cos[c+d\,x])^2\,EllipticF\left[\frac{1}{2}(c+d\,x),2\right]Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{Sec[c+d\,x]}}{7\,d}+$$

$$\frac{2\,C\sqrt{Cos[c+d\,x]}\,(a+a\,Cos[c+d\,x])^2\,EllipticF\left[\frac{1}{2}(c+d\,x),2\right]Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{Sec[c+d\,x]}}{3\,d}+$$

$$(a+a\,Cos[c+d\,x])^2\,Sec\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{Sec[c+d\,x]}\left(\frac{(3\,A+5\,C)\,Cos[d\,x]\,Csc[c]}{5\,d}+\frac{A\,Sec[c]\,Sec[c+d\,x]^3\,Sin[d\,x]}{14\,d}+\right.$$

$$\left.\frac{Sec[c]\,Sec[c+d\,x]^2\,(5\,A\,Sin[c]+14\,A\,Sin[d\,x])}{70\,d}+\frac{Sec[c]\,Sec[c+d\,x]\,(42\,A\,Sin[c]+60\,A\,Sin[d\,x]+35\,C\,Sin[d\,x])}{210\,d}+\frac{(12\,A+7\,C)\,Tan[c]}{42\,d}\right)$$

- **Problem 1169: Result unnecessarily involves higher level functions.**

$$\int(a+a\,Cos[c+d\,x])^2\left(A+C\,Cos[c+d\,x]^2\right)Sec[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 196 leaves, 8 steps):

$$-\frac{16\,a^2\,A\sqrt{Cos[c+d\,x]}\,EllipticE\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{Sec[c+d\,x]}}{5\,d}+$$

$$\frac{4\,a^2\,(A+3\,C)\sqrt{Cos[c+d\,x]}\,EllipticF\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{Sec[c+d\,x]}}{3\,d}+\frac{2\,a^2\,(17\,A+15\,C)\sqrt{Sec[c+d\,x]}\,Sin[c+d\,x]}{15\,d}+$$

$$\frac{8\,A\left(a^2+a^2\,Cos[c+d\,x]\right)Sec[c+d\,x]^{3/2}\,Sin[c+d\,x]}{15\,d}+\frac{2\,A\,(a+a\,Cos[c+d\,x])^2\,Sec[c+d\,x]^{5/2}\,Sin[c+d\,x]}{5\,d}$$

Result (type 5, 293 leaves):

$$\frac{1}{60\,d}a^2\,(1+\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4\left(-\frac{1}{-1+e^{2\,i\,c}}4\,i\,\sqrt{2}\,e^{-i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\left(12\,A\,\left(1+e^{2\,i\,(c+d\,x)}\right)+12\,A\,\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+5\,(A+3\,C)\,e^{i\,(c+d\,x)}\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+\sqrt{\text{Sec}[c+d\,x]}\,(3\,(16\,A+5\,C-5\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}[c]+30\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]+2\,A\,(10+3\,\text{Sec}[c+d\,x])\,\text{Tan}[c+d\,x])\right)$$

- **Problem 1170: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 196 leaves, 8 steps):

$$-\frac{4\,a^2\,(A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{8\,a^2\,(A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,d}-\frac{2\,a^2\,(5\,A-C)\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{8\,A\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 5, 181 leaves):

$$\frac{1}{6\,d}a^2\,\text{Sec}[c+d\,x]^{3/2}\left(12\,i\,A-12\,i\,C+12\,i\,A\,\text{Cos}[2\,(c+d\,x)]-12\,i\,C\,\text{Cos}[2\,(c+d\,x)]+16\,(A+C)\,\text{Cos}[c+d\,x]^{3/2}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]-12\,i\,(A-C)\,e^{-2\,i\,(c+d\,x)}\left(1+e^{2\,i\,(c+d\,x)}\right)^{3/2}\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]+4\,A\,\text{Sin}[c+d\,x]+C\,\text{Sin}[c+d\,x]+12\,A\,\text{Sin}[2\,(c+d\,x)]+C\,\text{Sin}[3\,(c+d\,x)]\right)$$

- **Problem 1171: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 200 leaves, 8 steps):

$$\frac{16\,a^2\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{4\,a^2\,(3\,A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,d}-\frac{2\,a^2\,(15\,A-7\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{2\,(5\,A-C)\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sin}[c+d\,x]}{5\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 5, 175 leaves) :

$$\frac{1}{30\,d\,\sqrt{\text{Sec}[c+d\,x]}}\,a^2\left(-96\,\mathrm{i}\,C+\frac{192\,\mathrm{i}\,C\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}-\frac{80\,\mathrm{i}\,(3\,A+C)\,e^{\mathrm{i}\,(c+d\,x)}\,\text{Hypergeometric2F1}\left[\frac{1}{4},\frac{1}{2},\frac{5}{4},-e^{2\,\mathrm{i}\,(c+d\,x)}\right]}{\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}}+40\,C\,\text{Sin}[c+d\,x]+3\,C\,\text{Sec}[c+d\,x]\,\text{Sin}[3\,(c+d\,x)]+60\,A\,\text{Tan}[c+d\,x]+3\,C\,\text{Tan}[c+d\,x]\right)$$

## Problem 1172: Result unnecessarily involves higher level functions.

$$\int(a+a\,\text{Cos}[c+d\,x])^2\left(A+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 204 leaves, 8 steps) :

$$\frac{4\,a^2\,(5\,A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+\frac{8\,a^2\,(7\,A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a^2\,(35\,A+33\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{7\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{8\,C\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sin}[c+d\,x]}{35\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 203 leaves) :

$$\frac{1}{420\,d}\,a^2\,e^{-\mathrm{i}\,(2\,c+d\,x)}\,\sqrt{\text{Sec}[c+d\,x]}\left(160\,(7\,A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]+336\,\mathrm{i}\,(5\,A+3\,C)\,e^{-\mathrm{i}\,(c+d\,x)}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,\mathrm{i}\,(c+d\,x)}\right]+2\,\text{Cos}[c+d\,x]\,(-840\,\mathrm{i}\,A-504\,\mathrm{i}\,C+5\,(28\,A+51\,C)\,\text{Sin}[c+d\,x]+84\,C\,\text{Sin}[2\,(c+d\,x)]+15\,C\,\text{Sin}[3\,(c+d\,x)])\right)(\text{Cos}[2\,c+d\,x]+\mathrm{i}\,\text{Sin}[2\,c+d\,x])$$

## Problem 1173: Result unnecessarily involves higher level functions.

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 237 leaves, 9 steps) :

$$\frac{16\,a^2\,(3\,A+2\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{15\,d}+\frac{4\,a^2\,(7\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{2\,a^2\,(21\,A+19\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{9\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{8\,C\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\text{Sin}[c+d\,x]}{63\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{4\,a^2\,(7\,A+5\,C)\,\text{Sin}[c+d\,x]}{21\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 220 leaves) :

$$\frac{1}{2520\,d}a^2\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(480\,(7\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]+\right.$$
$$2688\,i\,(3\,A+2\,C)\,e^{-i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]+$$
$$2\,\text{Cos}[c+d\,x]\,(-4032\,i\,A-2688\,i\,C+60\,(28\,A+23\,C)\,\text{Sin}[c+d\,x]+14\,(18\,A+37\,C)\,\text{Sin}[2\,(c+d\,x)]+$$
$$\left.180\,C\,\text{Sin}[3\,(c+d\,x)]+35\,C\,\text{Sin}[4\,(c+d\,x)])\right)\,(\text{Cos}[2\,c+d\,x]+i\,\text{Sin}[2\,c+d\,x])$$

- **Problem 1174: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^2\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 270 leaves, 10 steps) :

$$\frac{4\,a^2\,(9\,A+7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{15\,d}+$$
$$\frac{8\,a^2\,(33\,A+25\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{231\,d}+\frac{2\,a^2\,(99\,A+89\,C)\,\text{Sin}[c+d\,x]}{693\,d\,\text{Sec}[c+d\,x]^{5/2}}+$$
$$\frac{2\,C\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sin}[c+d\,x]}{11\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{8\,C\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{99\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{4\,a^2\,(9\,A+7\,C)\,\text{Sin}[c+d\,x]}{45\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{8\,a^2\,(33\,A+25\,C)\,\text{Sin}[c+d\,x]}{231\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 730 leaves) :

$$\frac{1}{5\sqrt{2}\,d}3\,A\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4+\frac{1}{15\sqrt{2}\,d}7\,C\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$

$$(a+a\,\text{Cos}[c+d\,x])^2\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4+$$

$$\frac{2\,A\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}}{7\,d}+$$

$$\frac{50\,C\sqrt{\text{Cos}[c+d\,x]}\;(a+a\,\text{Cos}[c+d\,x])^2\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}}{231\,d}+$$

$$(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{(198\,A+149\,C+234\,A\,\text{Cos}[2\,c]+187\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}[c]}{720\,d}+\right.$$

$$\frac{(2376\,A+2185\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{14784\,d}+\frac{(36\,A+43\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{720\,d}+\frac{(11\,A+27\,C)\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{1232\,d}+$$

$$\frac{C\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{144\,d}+\frac{C\,\text{Cos}[6\,d\,x]\,\text{Sin}[6\,c]}{704\,d}+\frac{(234\,A+187\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{360\,d}+\frac{(2376\,A+2185\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{14784\,d}+$$

$$\left.\frac{(36\,A+43\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{720\,d}+\frac{(11\,A+27\,C)\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{1232\,d}+\frac{C\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{144\,d}+\frac{C\,\text{Cos}[6\,c]\,\text{Sin}[6\,d\,x]}{704\,d}\right)$$

- **Problem 1175: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^3\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{13/2}\,dx$$

Optimal (type 4, 319 leaves, 11 steps):

$$-\frac{4\,a^3\,(5\,A+7\,C)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,d}+$$

$$\frac{4\,a^3\,(105\,A+143\,C)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{231\,d}+$$

$$\frac{4\,a^3\,(5\,A+7\,C)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{5\,d}+\frac{4\,a^3\,(105\,A+143\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{231\,d}+$$

$$\frac{8\,a^3\,(35\,A+44\,C)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{385\,d}+\frac{2\,(35\,A+33\,C)\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{231\,d}+$$

$$\frac{4\,A\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{33\,a\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{11/2}\,\text{Sin}[c+d\,x]}{11\,d}$$

Result (type 5, 677 leaves):

$$-\frac{1}{2\sqrt{2}\,d}A\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6-\frac{1}{10\sqrt{2}\,d}7\,C\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$
$$(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+$$
$$\frac{5\,A\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{22\,d}+$$
$$\frac{13\,C\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{42\,d}+$$
$$(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{(5\,A+7\,C)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}[c]}{10\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^5\,\mathrm{Sin}[d\,x]}{44\,d}+\right.$$
$$\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^4\,(3\,A\,\mathrm{Sin}[c]+11\,A\,\mathrm{Sin}[d\,x])}{132\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,(77\,A\,\mathrm{Sin}[c]+126\,A\,\mathrm{Sin}[d\,x]+33\,C\,\mathrm{Sin}[d\,x])}{924\,d}+$$
$$\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(630\,A\,\mathrm{Sin}[c]+165\,C\,\mathrm{Sin}[c]+770\,A\,\mathrm{Sin}[d\,x]+693\,C\,\mathrm{Sin}[d\,x])}{4620\,d}+$$
$$\left.\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(770\,A\,\mathrm{Sin}[c]+693\,C\,\mathrm{Sin}[c]+1050\,A\,\mathrm{Sin}[d\,x]+1430\,C\,\mathrm{Sin}[d\,x])}{4620\,d}+\frac{(105\,A+143\,C)\,\mathrm{Tan}[c]}{462\,d}\right)$$

- **Problem 1176: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^3\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 286 leaves, 10 steps):

$$-\frac{4\,a^3\,(17\,A+27\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{15\,d}+$$
$$\frac{4\,a^3\,(11\,A+21\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{21\,d}+\frac{4\,a^3\,(17\,A+27\,C)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,d}+$$
$$\frac{8\,a^3\,(16\,A+21\,C)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{105\,d}+\frac{2\,(73\,A+63\,C)\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{315\,d}+$$
$$\frac{4\,A\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{21\,a\,d}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{9/2}\,\mathrm{Sin}[c+d\,x]}{9\,d}$$

Result (type 5, 635 leaves):

$$-\frac{1}{30\sqrt{2}\,d}17\,A\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6-\frac{1}{10\sqrt{2}\,d}9\,C\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$

$$(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+$$

$$\frac{11\,A\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{42\,d}+$$

$$\frac{C\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{2\,d}+$$

$$(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{(17\,A+27\,C)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}[c]}{30\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^4\,\mathrm{Sin}[d\,x]}{36\,d}+\right.$$

$$\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,(7\,A\,\mathrm{Sin}[c]+27\,A\,\mathrm{Sin}[d\,x])}{252\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(135\,A\,\mathrm{Sin}[c]+238\,A\,\mathrm{Sin}[d\,x]+63\,C\,\mathrm{Sin}[d\,x])}{1260\,d}+$$

$$\left.\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(238\,A\,\mathrm{Sin}[c]+63\,C\,\mathrm{Sin}[c]+330\,A\,\mathrm{Sin}[d\,x]+315\,C\,\mathrm{Sin}[d\,x])}{1260\,d}+\frac{(22\,A+21\,C)\,\mathrm{Tan}[c]}{84\,d}\right)$$

- **Problem 1177: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^3\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 253 leaves, 9 steps):

$$-\frac{4\,a^3\,(7\,A+5\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{5\,d}+$$

$$\frac{4\,a^3\,(13\,A+35\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{21\,d}+$$

$$\frac{8\,a^3\,(53\,A+70\,C)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{105\,d}+\frac{2\,(7\,A+5\,C)\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{15\,d}+$$

$$\frac{12\,A\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{35\,a\,d}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{7\,d}$$

Result (type 5, 614 leaves):

$$-\frac{1}{10\sqrt{2}\,d}7\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6-\frac{1}{2\sqrt{2}\,d}$$
$$C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+\frac{13\,A\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{42\,d}+$$
$$\frac{5\,C\sqrt{\mathrm{Cos}[c+d\,x]}\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}}{6\,d}+(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{(-28\,A-25\,C+5\,C\,\mathrm{Cos}[2\,c])\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}[c]}{40\,d}+\frac{C\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{4\,d}+\frac{A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^3\,\mathrm{Sin}[d\,x]}{28\,d}+\right.$$
$$\left.\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,(5\,A\,\mathrm{Sin}[c]+21\,A\,\mathrm{Sin}[d\,x])}{140\,d}+\frac{\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(63\,A\,\mathrm{Sin}[c]+130\,A\,\mathrm{Sin}[d\,x]+35\,C\,\mathrm{Sin}[d\,x])}{420\,d}+\frac{(26\,A+7\,C)\,\mathrm{Tan}[c]}{84\,d}\right)$$

- **Problem 1178: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^3\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 253 leaves, 9 steps) :

$$-\frac{4\,a^3\,(9\,A-5\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{5\,d}+\frac{4\,a^3\,(3\,A+5\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,d}-$$
$$\frac{4\,a^3\,(21\,A+5\,C)\,\mathrm{Sin}[c+d\,x]}{15\,d\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{2\,(11\,A+5\,C)\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d}+$$
$$\frac{4\,A\left(a^2+a^2\,\mathrm{Cos}[c+d\,x]\right)^2\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{5\,a\,d}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,d}$$

Result (type 5, 604 leaves) :

$$-\frac{1}{10\sqrt{2}\,d}9\,A\,e^{-i\,(2c+d x)}\sqrt{\frac{e^{i\,(c+d x)}}{1+e^{2 i\,(c+d x)}}}\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]$$

$$\left(1+e^{2 i\,(c+d x)}+\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i\,(c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i\,(c+d x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6+\frac{1}{2\sqrt{2}\,d}$$

$$C\,e^{-i\,(2c+d x)}\sqrt{\frac{e^{i\,(c+d x)}}{1+e^{2 i\,(c+d x)}}}\,(a+a\,\text{Cos}[c+d x])^3\,\text{Csc}[c]\left(1+e^{2 i\,(c+d x)}+\left(-1+e^{2 i c}\right)\sqrt{1+e^{2 i\,(c+d x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2 i\,(c+d x)}\right]\right)$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6+\frac{A\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^3\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Sec}[c+d x]}}{2 d}+$$

$$\frac{5\,C\sqrt{\text{Cos}[c+d x]}\,(a+a\,\text{Cos}[c+d x])^3\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Sec}[c+d x]}}{6 d}+$$

$$(a+a\,\text{Cos}[c+d x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^6\sqrt{\text{Sec}[c+d x]}\left(-\frac{(-36\,A+5\,C+15\,C\,\text{Cos}[2c])\,\text{Cos}[d x]\,\text{Csc}[c]}{40 d}+\frac{C\,\text{Cos}[2 d x]\,\text{Sin}[2c]}{24 d}+\frac{3\,C\,\text{Cos}[c]\,\text{Sin}[d x]}{4 d}+\right.$$

$$\left.\frac{A\,\text{Sec}[c]\,\text{Sec}[c+d x]^2\,\text{Sin}[d x]}{20 d}+\frac{\text{Sec}[c]\,\text{Sec}[c+d x]\,(A\,\text{Sin}[c]+5\,A\,\text{Sin}[d x])}{20 d}+\frac{C\,\text{Cos}[2c]\,\text{Sin}[2 d x]}{24 d}+\frac{A\,\text{Tan}[c]}{4 d}\right)$$

- **Problem 1179: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+d x])^3\left(A+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^{5/2}\,dx$$

Optimal (type 4, 251 leaves, 9 steps):

$$-\frac{4\,a^3\,(5\,A-9\,C)\sqrt{\text{Cos}[c+d x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{5 d}+\frac{4\,a^3\,(5\,A+3\,C)\sqrt{\text{Cos}[c+d x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d x),2\right]\sqrt{\text{Sec}[c+d x]}}{3 d}-$$

$$\frac{8\,a^3\,(10\,A-3\,C)\,\text{Sin}[c+d x]}{15 d\sqrt{\text{Sec}[c+d x]}}-\frac{2\,(35\,A-3\,C)\left(a^3+a^3\,\text{Cos}[c+d x]\right)\text{Sin}[c+d x]}{15 d\sqrt{\text{Sec}[c+d x]}}+$$

$$\frac{4\,A\left(a^2+a^2\,\text{Cos}[c+d x]\right)^2\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{a d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d x])^3\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3 d}$$

Result (type 5, 245 leaves):

$$\frac{1}{60\,d} a^3 e^{-i(2c+dx)} \text{Sec}[c+dx]^{3/2} \left(120\, i\, A - 216\, i\, C + 120\, i\, A \,\text{Cos}[2(c+dx)] - 216\, i\, C\,\text{Cos}[2(c+dx)] + 80\,(5A+3C)\,\text{Cos}[c+dx]^{3/2}\,\text{EllipticF}\left[\frac{1}{2}(c+dx), 2\right] - 24\, i\,(5A-9C)\, e^{-2i(c+dx)} \left(1+e^{2i(c+dx)}\right)^{3/2} \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2i(c+dx)}\right] + 40\,A\,\text{Sin}[c+dx] + 30\,C\,\text{Sin}[c+dx] + 180\,A\,\text{Sin}[2(c+dx)] + 6\,C\,\text{Sin}[2(c+dx)] + 30\,C\,\text{Sin}[3(c+dx)] + 3\,C\,\text{Sin}[4(c+dx)]\right) (\text{Cos}[2c+dx] + i\,\text{Sin}[2c+dx])$$

- **Problem 1180: Result unnecessarily involves higher level functions.**

$$\int (a + a\,\text{Cos}[c+dx])^3 \left(A + C\,\text{Cos}[c+dx]^2\right) \text{Sec}[c+dx]^{3/2}\, dx$$

Optimal (type 4, 257 leaves, 9 steps):

$$\frac{4 a^3 (5A+7C) \sqrt{\text{Cos}[c+dx]}\, \text{EllipticE}\left[\frac{1}{2}(c+dx), 2\right] \sqrt{\text{Sec}[c+dx]}}{5\,d} + \frac{4 a^3 (35A+13C) \sqrt{\text{Cos}[c+dx]}\, \text{EllipticF}\left[\frac{1}{2}(c+dx), 2\right] \sqrt{\text{Sec}[c+dx]}}{21\,d} - \frac{4 a^3 (35A-41C)\,\text{Sin}[c+dx]}{105\,d\sqrt{\text{Sec}[c+dx]}} - \frac{2(7A-C)\left(a^2+a^2\,\text{Cos}[c+dx]\right)^2 \text{Sin}[c+dx]}{7\,a\,d\sqrt{\text{Sec}[c+dx]}} - \frac{2(35A-11C)\left(a^3+a^3\,\text{Cos}[c+dx]\right)\text{Sin}[c+dx]}{35\,d\sqrt{\text{Sec}[c+dx]}} + \frac{2A(a+a\,\text{Cos}[c+dx])^3 \sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{d}$$

Result (type 5, 231 leaves):

$$\frac{1}{420\,d} a^3 e^{-i(2c+dx)} \sqrt{\text{Sec}[c+dx]} \left(-1680\, i\, A\,\text{Cos}[c+dx] - 2352\, i\, C\,\text{Cos}[c+dx] + 80\,(35A+13C)\sqrt{\text{Cos}[c+dx]}\,\text{EllipticF}\left[\frac{1}{2}(c+dx), 2\right] + 336\, i\,(5A+7C)\, e^{-i(c+dx)} \sqrt{1+e^{2i(c+dx)}}\, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2i(c+dx)}\right] + 840\,A\,\text{Sin}[c+dx] + 126\,C\,\text{Sin}[c+dx] + 140\,A\,\text{Sin}[2(c+dx)] + 550\,C\,\text{Sin}[2(c+dx)] + 126\,C\,\text{Sin}[3(c+dx)] + 15\,C\,\text{Sin}[4(c+dx)]\right) (\text{Cos}[2c+dx] + i\,\text{Sin}[2c+dx])$$

- **Problem 1181: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int (a + a\,\text{Cos}[c+dx])^3 \left(A + C\,\text{Cos}[c+dx]^2\right) \sqrt{\text{Sec}[c+dx]}\, dx$$

Optimal (type 4, 253 leaves, 9 steps):

$$\frac{4\,a^3\,(27\,A+17\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{15\,d}+$$

$$\frac{4\,a^3\,(21\,A+11\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{21\,d}+\frac{8\,a^3\,(21\,A+16\,C)\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{2\,C\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sin}[c+d\,x]}{9\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{4\,C\,\left(a^2+a^2\,\text{Cos}[c+d\,x]\right)^2\,\text{Sin}[c+d\,x]}{21\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,(63\,A+73\,C)\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sin}[c+d\,x]}{315\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 684 leaves):

$$\frac{1}{10\,\sqrt{2}\,d}9\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+\frac{1}{30\,\sqrt{2}\,d}17\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$

$$(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+$$

$$\frac{A\,\sqrt{\text{Cos}[c+d\,x]}\,\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\text{Sec}[c+d\,x]}}{2\,d}+$$

$$\frac{11\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\text{Sec}[c+d\,x]}}{42\,d}+$$

$$(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(-\frac{(1278\,A+743\,C+1314\,A\,\text{Cos}[2\,c]+889\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}[c]}{2880\,d}+\frac{(42\,A+53\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{336\,d}+\frac{(36\,A+151\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{2880\,d}+\right.$$

$$\frac{3\,C\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{224\,d}+\frac{C\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{576\,d}+\frac{(1314\,A+889\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{1440\,d}+\frac{(42\,A+53\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{336\,d}+$$

$$\left.\frac{(36\,A+151\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{2880\,d}+\frac{3\,C\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{224\,d}+\frac{C\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{576\,d}\right)$$

- **Problem 1182: Result unnecessarily involves higher level functions.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^3\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 286 leaves, 10 steps):

$$\frac{4 a^3 (7 A+5 C) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{5 d}+$$

$$\frac{4 a^3 (143 A+105 C) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{231 d}+\frac{8 a^3 (44 A+35 C) \text{Sin}[c+d x]}{385 d\, \text{Sec}[c+d x]^{3/2}}+$$

$$\frac{2 C (a+a \text{Cos}[c+d x])^3 \text{Sin}[c+d x]}{11 d\, \text{Sec}[c+d x]^{3/2}}+\frac{4 C \left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Sin}[c+d x]}{33 a d\, \text{Sec}[c+d x]^{3/2}}+$$

$$\frac{2 (33 A+35 C) \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{231 d\, \text{Sec}[c+d x]^{3/2}}+\frac{4 a^3 (143 A+105 C) \text{Sin}[c+d x]}{231 d \sqrt{\text{Sec}[c+d x]}}$$

Result (type 5, 208 leaves) :

$$\frac{1}{18480 d} a^3 \sqrt{\text{Sec}[c+d x]} \left(320 (143 A+105 C) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right]+\right.$$
$$14784 \text{i} (7 A+5 C) e^{-\text{i} (c+d x)} \sqrt{1+e^{2 \text{i} (c+d x)}}\, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 \text{i} (c+d x)}\right]+$$
$$2 \text{Cos}[c+d x] (-51744 \text{i} A-36960 \text{i} C+10 (2354 A+1953 C) \text{Sin}[c+d x]+308 (18 A+25 C) \text{Sin}[2 (c+d x)]+$$
$$\left.660 A \text{Sin}[3 (c+d x)]+2835 C \text{Sin}[3 (c+d x)]+770 C \text{Sin}[4 (c+d x)]+105 C \text{Sin}[5 (c+d x)])\right)$$

- **Problem 1183: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{(a+a \text{Cos}[c+d x])^3 \left(A+C \text{Cos}[c+d x]^2\right)}{\text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 319 leaves, 11 steps) :

$$\frac{4 a^3 (221 A+175 C) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{195 d}+$$

$$\frac{4 a^3 (121 A+95 C) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{231 d}+\frac{40 a^3 (143 A+118 C) \text{Sin}[c+d x]}{9009 d\, \text{Sec}[c+d x]^{5/2}}+$$

$$\frac{2 C (a+a \text{Cos}[c+d x])^3 \text{Sin}[c+d x]}{13 d\, \text{Sec}[c+d x]^{5/2}}+\frac{12 C \left(a^2+a^2 \text{Cos}[c+d x]\right)^2 \text{Sin}[c+d x]}{143 a d\, \text{Sec}[c+d x]^{5/2}}+$$

$$\frac{2 (143 A+145 C) \left(a^3+a^3 \text{Cos}[c+d x]\right) \text{Sin}[c+d x]}{1287 d\, \text{Sec}[c+d x]^{5/2}}+\frac{4 a^3 (221 A+175 C) \text{Sin}[c+d x]}{585 d\, \text{Sec}[c+d x]^{3/2}}+\frac{4 a^3 (121 A+95 C) \text{Sin}[c+d x]}{231 d \sqrt{\text{Sec}[c+d x]}}$$

Result (type 5, 776 leaves) :

$$\frac{1}{30\sqrt{2}\,d}17\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+\frac{1}{78\sqrt{2}\,d}35\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}$$

$$(a+a\,\text{Cos}[c+d\,x])^3\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6+$$

$$\frac{11\,A\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}}{42\,d}+$$

$$\frac{95\,C\sqrt{\text{Cos}[c+d\,x]}\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}}{462\,d}+(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{(77272\,A+59375\,C+92456\,A\,\text{Cos}[2\,c]+75025\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}[c]}{299520\,d}+\frac{(4664\,A+4267\,C)\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{29568\,d}+\right.$$

$$\frac{(7852\,A+9005\,C)\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{149760\,d}+\frac{(33\,A+59\,C)\,\text{Cos}[4\,d\,x]\,\text{Sin}[4\,c]}{2464\,d}+\frac{(52\,A+245\,C)\,\text{Cos}[5\,d\,x]\,\text{Sin}[5\,c]}{29952\,d}+\frac{3\,C\,\text{Cos}[6\,d\,x]\,\text{Sin}[6\,c]}{1408\,d}+$$

$$\frac{C\,\text{Cos}[7\,d\,x]\,\text{Sin}[7\,c]}{3328\,d}+\frac{(92456\,A+75025\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{149760\,d}+\frac{(4664\,A+4267\,C)\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{29568\,d}+\frac{(7852\,A+9005\,C)\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{149760\,d}+$$

$$\left.\frac{(33\,A+59\,C)\,\text{Cos}[4\,c]\,\text{Sin}[4\,d\,x]}{2464\,d}+\frac{(52\,A+245\,C)\,\text{Cos}[5\,c]\,\text{Sin}[5\,d\,x]}{29952\,d}+\frac{3\,C\,\text{Cos}[6\,c]\,\text{Sin}[6\,d\,x]}{1408\,d}+\frac{C\,\text{Cos}[7\,c]\,\text{Sin}[7\,d\,x]}{3328\,d}\right)$$

- **Problem 1184: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{7/2}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 232 leaves, 8 steps):

$$-\frac{3\,(7\,A+5\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,a\,d}-$$

$$\frac{(5\,A+3\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,d}+\frac{3\,(7\,A+5\,C)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,a\,d}-$$

$$\frac{(5\,A+3\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a\,d}+\frac{(7\,A+5\,C)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}-\frac{(A+C)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])}$$

Result (type 5, 666 leaves):

$$-\left(21\,A\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\right.$$

$$\left.\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]\right)\Big/\left(5\sqrt{2}\,d\,(a+a\,\mathrm{Cos}[c+d\,x])\right)-$$

$$\frac{1}{\sqrt{2}\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}3\,C\,e^{-i\,(2c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]-$$

$$\frac{5\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}-$$

$$\frac{C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}+\frac{1}{a+a\,\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{3\,(7\,A+5\,C)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{5\,d}-\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}[d\,x]}{5\,d}+\frac{4\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,(3\,A\,\mathrm{Sin}[c]-5\,A\,\mathrm{Sin}[d\,x])}{15\,d}-\frac{2\,(2\,A+5\,A\,\mathrm{Cos}[c]+3\,C\,\mathrm{Cos}[c])\,\mathrm{Sec}[c]\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 1185: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{5/2}}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 190 leaves, 7 steps):

$$\frac{(3\,A+C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d}+\frac{(5\,A+3\,C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,a\,d}-$$

$$\frac{(3\,A+C)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{a\,d}+\frac{(5\,A+3\,C)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a\,d}-\frac{(A+C)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 5, 628 leaves):

$$\frac{1}{\sqrt{2}\, d\,(a+a\,\mathrm{Cos}[c+d\,x])} 3\,A\,e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \mathrm{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{1}{\sqrt{2}\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

$$C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{5\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}+\frac{1}{a+a\,\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{(3\,A+C)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{d}+\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}+\right.$$

$$\left.\frac{4\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{2\,(2\,A+5\,A\,\mathrm{Cos}[c]+3\,C\,\mathrm{Cos}[c])\,\mathrm{Sec}[c]\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 1186: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{3/2}}{a+a\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 153 leaves, 6 steps) :

$$-\frac{(3\,A+C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d}-$$

$$\frac{(A-C)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a\,d}+\frac{(3\,A+C)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{a\,d}-\frac{(A+C)\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])}$$

Result (type 5, 376 leaves) :

$$\frac{1}{2\,a\,d\,(1+\text{Cos}[c+d\,x])}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$
$$\left(-6\,\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-\right.$$
$$2\,\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-$$
$$4\,A\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}+4\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}+$$
$$\left.2\,\sqrt{\text{Sec}[c+d\,x]}\,\left(2\,(3\,A+C)\,\text{Cos}[d\,x]\,\text{Csc}[c]-2\,(A+C)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 1187: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}}{a+a\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 123 leaves, 5 steps) :

$$\frac{(A+3\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a\,d}+$$
$$\frac{(A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 401 leaves) :

$$\frac{1}{2\,a\,d\,(1+\text{Cos}[c+d\,x])}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\left(2\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+\right.$$

$$6\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-$$

$$\frac{2\left((A+2\,C)\,\text{Cos}\left[\frac{1}{2}(c-d\,x)\right]+C\,\text{Cos}\left[\frac{1}{2}(3\,c+d\,x)\right]\right)\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]}{\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\left.4\,A\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}-4\,C\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}\right)$$

- **Problem 1188: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 162 leaves, 6 steps):

$$-\frac{(A+3\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a\,d}+$$

$$\frac{(3\,A+5\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}+\frac{(3\,A+5\,C)\,\text{Sin}[c+d\,x]}{3\,a\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 645 leaves):

$$-\frac{1}{\sqrt{2}\, d\, (a+a\,\text{Cos}[c+d\,x])} A\, e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\ \text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \text{Csc}\left[\frac{c}{2}\right] \left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right) \text{Sec}\left[\frac{c}{2}\right] - \frac{1}{\sqrt{2}\, d\, (a+a\,\text{Cos}[c+d\,x])}$$

$$3\,C\, e^{-i\,(2\,c+d\,x)} \sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\ \text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \text{Csc}\left[\frac{c}{2}\right] \left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\ \text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\text{Sec}\left[\frac{c}{2}\right] + \frac{A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right] \text{Sec}\left[\frac{c}{2}\right] \sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])} +$$

$$\frac{5\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right] \text{Sec}\left[\frac{c}{2}\right] \sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])} + \frac{1}{a+a\,\text{Cos}[c+d\,x]}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2 \sqrt{\text{Sec}[c+d\,x]} \left(\frac{(A+2\,C+C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{d} + \frac{2\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d} - \right.$$

$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{d} - \frac{4\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d} + \frac{2\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d} - \frac{2\,(A+C)\,\text{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

- **Problem 1189: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 199 leaves, 7 steps):

$$\frac{3\,(5\,A+7\,C)\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,a\,d} - \frac{(3\,A+5\,C)\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,d} -$$

$$\frac{(A+C)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}} + \frac{(5\,A+7\,C)\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Sec}[c+d\,x]^{3/2}} - \frac{(3\,A+5\,C)\,\text{Sin}[c+d\,x]}{3\,a\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 438 leaves):

$$\frac{1}{60\,a\,d\,(1+\text{Cos}[c+d\,x])}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\left(180\,\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)+\right.$$

$$252\,\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Csc}[c]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)-$$

$$120\,A\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}-$$

$$200\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}-\frac{1}{\sqrt{\text{Sec}[c+d\,x]}}2\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\left.\left((60\,A+83\,C)\,\text{Cos}\left[\frac{1}{2}\,(c-d\,x)\right]+(30\,A+43\,C)\,\text{Cos}\left[\frac{1}{2}\,(3\,c+d\,x)\right]+C\,\text{Sin}[c]\,\left(7\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]-3\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)\right)\right)$$

- **Problem 1190: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 232 leaves, 8 steps):

$$-\frac{3\,(5\,A+7\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,a\,d}+\frac{5\,(7\,A+9\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{21\,a\,d}-$$

$$\frac{(A+C)\,\text{Sin}[c+d\,x]}{d\,(a+a\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{7/2}}+\frac{(7\,A+9\,C)\,\text{Sin}[c+d\,x]}{7\,a\,d\,\text{Sec}[c+d\,x]^{5/2}}-\frac{(5\,A+7\,C)\,\text{Sin}[c+d\,x]}{5\,a\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{5\,(7\,A+9\,C)\,\text{Sin}[c+d\,x]}{21\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 751 leaves):

$$-\frac{1}{\sqrt{2}\, d\, (a+a\,\mathrm{Cos}[c+d\,x])}3\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2$$
$$\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]-$$
$$\left(21\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\right.$$
$$\left.\mathrm{Sec}\left[\frac{c}{2}\right]\right)\Big/\left(5\sqrt{2}\,d\,(a+a\,\mathrm{Cos}[c+d\,x])\right)+\frac{5\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}+$$
$$\frac{15\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c]}{7\,d\,(a+a\,\mathrm{Cos}[c+d\,x])}+\frac{1}{a+a\,\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{(40\,A+51\,C+20\,A\,\mathrm{Cos}[2\,c]+33\,C\,\mathrm{Cos}[2\,c])\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{20\,d}+\right.$$
$$\frac{(14\,A+27\,C)\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{21\,d}-\frac{C\,\mathrm{Cos}[3\,d\,x]\,\mathrm{Sin}[3\,c]}{5\,d}+\frac{C\,\mathrm{Cos}[4\,d\,x]\,\mathrm{Sin}[4\,c]}{14\,d}-\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{d}-$$
$$\left.\frac{(20\,A+33\,C)\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{5\,d}+\frac{(14\,A+27\,C)\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{21\,d}-\frac{C\,\mathrm{Cos}[3\,c]\,\mathrm{Sin}[3\,d\,x]}{5\,d}+\frac{C\,\mathrm{Cos}[4\,c]\,\mathrm{Sin}[4\,d\,x]}{14\,d}-\frac{2\,(A+C)\,\mathrm{Tan}\left[\frac{c}{2}\right]}{d}\right)$$

- **Problem 1191: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{5/2}}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 229 leaves, 8 steps) :

$$\frac{(7\,A+C)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a^2\,d}+$$
$$\frac{2\,(5\,A+C)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,a^2\,d}-\frac{(7\,A+C)\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{a^2\,d}+$$
$$\frac{2\,(5\,A+C)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d}-\frac{(7\,A+C)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A+C)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 5, 709 leaves) :

$$\frac{1}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}7\,\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{1}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

$$\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{20\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+$$

$$\frac{4\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}+$$

$$\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(-\frac{2\,(7\,A+C)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{d}+\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{8\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(4\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$

$$\left.\frac{8\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{3\,d}+\frac{8\,(A+5\,A\,\mathrm{Cos}[c]+C\,\mathrm{Cos}[c])\,\mathrm{Sec}[c]\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{2\,(A+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 1192: Result unnecessarily involves higher level functions.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{3/2}}{(a+a\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 195 leaves, 7 steps):

$$-\frac{4\,A\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a^2\,d}-\frac{(5\,A-C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,a^2\,d}+$$

$$\frac{4\,A\,\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{a^2\,d}-\frac{(5\,A-C)\,\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,a^2\,d\,(1+\mathrm{Cos}[c+d\,x])}-\frac{(A+C)\,\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 5, 286 leaves):

$$-\frac{1}{12\,a^2\,d\,(1+\text{Cos}[c+d\,x])^2}\,e^{-3\,i\,(c+d\,x)}\,\left(1+e^{i\,(c+d\,x)}\right)\,\Bigg((5\,A-C)\,e^{i\,(c+d\,x)}\,\left(1+e^{i\,(c+d\,x)}\right)^3\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]-$$
$$i\,\Big(12\,A+31\,A\,e^{i\,(c+d\,x)}+C\,e^{i\,(c+d\,x)}+29\,A\,e^{2\,i\,(c+d\,x)}-C\,e^{2\,i\,(c+d\,x)}+19\,A\,e^{3\,i\,(c+d\,x)}+C\,e^{3\,i\,(c+d\,x)}+5\,A\,e^{4\,i\,(c+d\,x)}-$$
$$C\,e^{4\,i\,(c+d\,x)}-12\,A\,\left(1+e^{i\,(c+d\,x)}\right)^3\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\Big)\Bigg)\,\sqrt{\text{Sec}[c+d\,x]}$$

- **Problem 1193: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}}{(a+a\,\text{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 165 leaves, 6 steps):

$$\frac{(A-C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{a^2\,d}+\frac{2\,(A+C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}-$$
$$\frac{(A-C)\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 681 leaves):

$$\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}\sqrt{2}\,\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\,\text{Sec}\left[\frac{c}{2}\right]-\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}$$
$$\sqrt{2}\,\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\text{Csc}\left[\frac{c}{2}\right]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}\right]+\frac{4\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}\left[\frac{c}{2}\right]\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+$$
$$\frac{4\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}\left[\frac{c}{2}\right]\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\,\text{Sec}\left[\frac{c}{2}\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\sqrt{\text{Sec}[c+d\,x]}\,\left(-\frac{2\,(A-C)\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}\right]}{d}+\frac{8\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-2\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\right.$$
$$\left.\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{8\,(A-2\,C)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

**Problem 1194: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + C \cos[c + d x]^2}{(a + a \cos[c + d x])^2 \sqrt{\sec[c + d x]}} \, dx$$

Optimal (type 4, 166 leaves, 6 steps):

$$\frac{4 C \sqrt{\cos[c + d x]} \, \text{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\sec[c + d x]}}{a^2 d} + \frac{(A - 5 C) \sqrt{\cos[c + d x]} \, \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\sec[c + d x]}}{3 a^2 d} - \frac{(A + C) \sin[c + d x]}{3 d (a + a \cos[c + d x])^2 \sec[c + d x]^{3/2}} + \frac{(A - 5 C) \sin[c + d x]}{3 a^2 d (1 + \cos[c + d x]) \sqrt{\sec[c + d x]}}$$

Result (type 5, 539 leaves):

$$\frac{1}{d (a + a \cos[c + d x])^2} 4 \sqrt{2} \, C \, e^{-i (2 c + d x)} \sqrt{\frac{e^{i (c + d x)}}{1 + e^{2 i (c + d x)}}} \cos\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \csc\left[\frac{c}{2}\right] \left(1 + e^{2 i (c + d x)} + \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c + d x)}} \, \text{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c + d x)}\right]\right) \sec\left[\frac{c}{2}\right] + \frac{2 A \cos\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \sqrt{\cos[c + d x]} \csc\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sec\left[\frac{c}{2}\right] \sqrt{\sec[c + d x]} \sin[c]}{3 d (a + a \cos[c + d x])^2} - \frac{10 C \cos\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \sqrt{\cos[c + d x]} \csc\left[\frac{c}{2}\right] \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sec\left[\frac{c}{2}\right] \sqrt{\sec[c + d x]} \sin[c]}{3 d (a + a \cos[c + d x])^2} + \frac{1}{(a + a \cos[c + d x])^2} \cos\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \sqrt{\sec[c + d x]} \left(-\frac{2 C (3 + \cos[2 c]) \cos[d x] \csc\left[\frac{c}{2}\right] \sec\left[\frac{c}{2}\right]}{d} - \frac{2 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \left(A \sin\left[\frac{d x}{2}\right] + C \sin\left[\frac{d x}{2}\right]\right)}{3 d} + \frac{4 \sec\left[\frac{c}{2}\right] \sec\left[\frac{c}{2} + \frac{d x}{2}\right] \left(A \sin\left[\frac{d x}{2}\right] + 7 C \sin\left[\frac{d x}{2}\right]\right)}{3 d} + \frac{8 C \cos[c] \sin[d x]}{d} + \frac{4 (A + 7 C) \tan\left[\frac{c}{2}\right]}{3 d} - \frac{2 (A + C) \sec\left[\frac{c}{2} + \frac{d x}{2}\right]^2 \tan\left[\frac{c}{2}\right]}{3 d}\right)$$

**Problem 1195: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + C \cos[c + d x]^2}{(a + a \cos[c + d x])^2 \sec[c + d x]^{3/2}} \, dx$$

Optimal (type 4, 201 leaves, 7 steps):

$$-\frac{(A + 7 C) \sqrt{\cos[c + d x]} \, \text{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\sec[c + d x]}}{a^2 d} + \frac{2 (A + 5 C) \sqrt{\cos[c + d x]} \, \text{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\sec[c + d x]}}{3 a^2 d} - \frac{(A + C) \sin[c + d x]}{3 d (a + a \cos[c + d x])^2 \sec[c + d x]^{5/2}} - \frac{(A + 7 C) \sin[c + d x]}{3 a^2 d (1 + \cos[c + d x]) \sec[c + d x]^{3/2}} + \frac{2 (A + 5 C) \sin[c + d x]}{3 a^2 d \sqrt{\sec[c + d x]}}$$

Result (type 5, 738 leaves) :

$$-\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}\sqrt{2}\;A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\,\text{Csc}\Big[\frac{c}{2}\Big]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\Big]\right)\text{Sec}\Big[\frac{c}{2}\Big]-\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}$$
$$7\sqrt{2}\;C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\,\text{Csc}\Big[\frac{c}{2}\Big]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\Big[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\Big]\right)$$
$$\text{Sec}\Big[\frac{c}{2}\Big]+\frac{4\,A\,\text{Cos}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^4\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\big[\frac{c}{2}\big]\;\text{EllipticF}\big[\frac{1}{2}\,(c+d\,x),2\big]\;\text{Sec}\big[\frac{c}{2}\big]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+$$
$$\frac{20\,C\,\text{Cos}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^4\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\big[\frac{c}{2}\big]\;\text{EllipticF}\big[\frac{1}{2}\,(c+d\,x),2\big]\;\text{Sec}\big[\frac{c}{2}\big]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}$$
$$\text{Cos}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^4\sqrt{\text{Sec}[c+d\,x]}\;\left(\frac{2\,(A+5\,C+2\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\big[\frac{c}{2}\big]\,\text{Sec}\big[\frac{c}{2}\big]}{d}+\frac{4\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d}+\right.$$
$$\frac{2\,\text{Sec}\big[\frac{c}{2}\big]\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^3\,\big(A\,\text{Sin}\big[\frac{d\,x}{2}\big]+C\,\text{Sin}\big[\frac{d\,x}{2}\big]\big)}{3\,d}-\frac{8\,\text{Sec}\big[\frac{c}{2}\big]\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]\,\big(2\,A\,\text{Sin}\big[\frac{d\,x}{2}\big]+5\,C\,\text{Sin}\big[\frac{d\,x}{2}\big]\big)}{3\,d}-$$
$$\left.\frac{16\,C\,\text{Cos}[c]\,\text{Sin}[d\,x]}{d}+\frac{4\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d}-\frac{8\,(2\,A+5\,C)\,\text{Tan}\big[\frac{c}{2}\big]}{3\,d}+\frac{2\,(A+C)\,\text{Sec}\big[\frac{c}{2}+\frac{d\,x}{2}\big]^2\,\text{Tan}\big[\frac{c}{2}\big]}{3\,d}\right)$$

- **Problem 1196: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 236 leaves, 8 steps) :

$$\frac{4\,(5\,A+14\,C)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\big[\frac{1}{2}\,(c+d\,x),2\big]\sqrt{\text{Sec}[c+d\,x]}}{5\,a^2\,d}-\frac{5\,(A+3\,C)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\big[\frac{1}{2}\,(c+d\,x),2\big]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}-$$
$$\frac{(A+C)\,\text{Sin}[c+d\,x]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{7/2}}-\frac{(A+3\,C)\,\text{Sin}[c+d\,x]}{a^2\,d\,(1+\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{5/2}}+\frac{4\,(5\,A+14\,C)\,\text{Sin}[c+d\,x]}{15\,a^2\,d\,\text{Sec}[c+d\,x]^{3/2}}-\frac{5\,(A+3\,C)\,\text{Sin}[c+d\,x]}{3\,a^2\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 791 leaves) :

$$\frac{1}{d\,(a+a\,\text{Cos}[c+d\,x])^2}4\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]+$$
$$\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^2}56\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]-$$
$$\frac{10\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-$$
$$\frac{10\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])^2}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^2}$$
$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{(60\,A+151\,C+20\,A\,\text{Cos}[2\,c]+73\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{10\,d}-\frac{8\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{3\,d}+\right.$$
$$\frac{2\,C\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{5\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(7\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+13\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+$$
$$\left.\frac{2\,(20\,A+73\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{5\,d}-\frac{8\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{3\,d}+\frac{2\,C\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{5\,d}+\frac{4\,(7\,A+13\,C)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{3\,d}\right)$$

- **Problem 1197: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 282 leaves, 9 steps):

$$\frac{(119\,A+9\,C)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{(11\,A+C)\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{2\,a^3\,d}-$$
$$\frac{(119\,A+9\,C)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{10\,a^3\,d}+\frac{(11\,A+C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,a^3\,d}-$$
$$\frac{(A+C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-\frac{2\,A\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2}-\frac{(119\,A+9\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{30\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)}$$

Result (type 5, 802 leaves):

$$\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}119\,\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\,\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}$$

$$9\,\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}\right]+\frac{22\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{2\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(-\frac{2\,(119\,A+9\,C)\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}\right]}{5\,d}+\right.$$

$$\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\,\left(13\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+$$

$$\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\,\left(29\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+3\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+\frac{16\,A\,\mathrm{Sec}[c]\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}[d\,x]}{3\,d}+$$

$$\left.\frac{4\,(4\,A+33\,A\,\mathrm{Cos}[c]+3\,C\,\mathrm{Cos}[c])\,\mathrm{Sec}[c]\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{4\,(13\,A+3\,C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\,\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\,\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 1198: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{3/2}}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 259 leaves, 8 steps):

$$-\frac{(49\,A-C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{10\,a^3\,d}-$$

$$\frac{(13\,A-C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{6\,a^3\,d}+\frac{(49\,A-C)\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{10\,a^3\,d}-$$

$$\frac{(A+C)\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}-\frac{2\,(4\,A-C)\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2}-\frac{(13\,A-C)\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)}$$

Result (type 5, 777 leaves):

$$-\frac{1}{5 d (a+a \operatorname{Cos}[c+d x])^3} 49 \sqrt{2} A e^{-i (2 c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2 i (c+d x)}+\left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{ Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right) \operatorname{Sec}\left[\frac{c}{2}\right]+\frac{1}{5 d (a+a \operatorname{Cos}[c+d x])^3}$$

$$\sqrt{2} C e^{-i (2 c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right]\left(1+e^{2 i (c+d x)}+\left(-1+e^{2 i c}\right) \sqrt{1+e^{2 i (c+d x)}} \text{ Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right)$$

$$\operatorname{Sec}\left[\frac{c}{2}\right]-\frac{26 A \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}\left[\frac{c}{2}\right] \text{ EllipticF}\left[\frac{1}{2}(c+d x), 2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c]}{3 d (a+a \operatorname{Cos}[c+d x])^3}+$$

$$\frac{2 C \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}\left[\frac{c}{2}\right] \text{ EllipticF}\left[\frac{1}{2}(c+d x), 2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c]}{3 d (a+a \operatorname{Cos}[c+d x])^3}+$$

$$\frac{1}{(a+a \operatorname{Cos}[c+d x])^3} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^6 \sqrt{\operatorname{Sec}[c+d x]}$$

$$\left(\frac{2 (49 A-C) \operatorname{Cos}[d x] \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]}{5 d}-\frac{8 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3\left(4 A \operatorname{Sin}\left[\frac{d x}{2}\right]-C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{15 d}-\frac{4 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]\left(13 A \operatorname{Sin}\left[\frac{d x}{2}\right]-C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{3 d}-\right.$$

$$\left.\frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\left(A \operatorname{Sin}\left[\frac{d x}{2}\right]+C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{5 d}-\frac{4 (13 A-C) \operatorname{Tan}\left[\frac{c}{2}\right]}{3 d}-\frac{8 (4 A-C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \operatorname{Tan}\left[\frac{c}{2}\right]}{15 d}-\frac{2 (A+C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \operatorname{Tan}\left[\frac{c}{2}\right]}{5 d}\right)$$

- **Problem 1199: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \sqrt{\operatorname{Sec}[c+d x]}}{(a+a \operatorname{Cos}[c+d x])^3} \, dx$$

Optimal (type 4, 224 leaves, 7 steps):

$$\frac{(9 A-C) \sqrt{\operatorname{Cos}[c+d x]} \text{ EllipticE}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{10 a^3 d}+\frac{(3 A+C) \sqrt{\operatorname{Cos}[c+d x]} \text{ EllipticF}\left[\frac{1}{2}(c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{6 a^3 d}-$$

$$\frac{(A+C) \operatorname{Sin}[c+d x]}{5 d (a+a \operatorname{Cos}[c+d x])^3 \sqrt{\operatorname{Sec}[c+d x]}}-\frac{2 (3 A-2 C) \operatorname{Sin}[c+d x]}{15 a d (a+a \operatorname{Cos}[c+d x])^2 \sqrt{\operatorname{Sec}[c+d x]}}-\frac{(9 A-C) \operatorname{Sin}[c+d x]}{10 d\left(a^3+a^3 \operatorname{Cos}[c+d x]\right) \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 5, 772 leaves):

$$\frac{1}{5 d (a + a \operatorname{Cos}[c + d x])^3} 9 \sqrt{2} A e^{-i (2 c + d x)} \sqrt{\frac{e^{i (c+d x)}}{1 + e^{2 i (c+d x)}}} \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right]$$

$$\left(1 + e^{2 i (c+d x)} + \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right) \operatorname{Sec}\left[\frac{c}{2}\right] - \frac{1}{5 d (a + a \operatorname{Cos}[c + d x])^3}$$

$$\sqrt{2} C e^{-i (2 c + d x)} \sqrt{\frac{e^{i (c+d x)}}{1 + e^{2 i (c+d x)}}} \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \operatorname{Csc}\left[\frac{c}{2}\right] \left(1 + e^{2 i (c+d x)} + \left(-1 + e^{2 i c}\right) \sqrt{1 + e^{2 i (c+d x)}} \operatorname{Hypergeometric2F1}\left[-\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, -e^{2 i (c+d x)}\right]\right)$$

$$\operatorname{Sec}\left[\frac{c}{2}\right] + \frac{2 A \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c]}{d (a + a \operatorname{Cos}[c + d x])^3} +$$

$$\frac{2 C \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \operatorname{Sec}\left[\frac{c}{2}\right] \sqrt{\operatorname{Sec}[c + d x]} \operatorname{Sin}[c]}{3 d (a + a \operatorname{Cos}[c + d x])^3} +$$

$$\frac{1}{(a + a \operatorname{Cos}[c + d x])^3} \operatorname{Cos}\left[\frac{c}{2} + \frac{d x}{2}\right]^6 \sqrt{\operatorname{Sec}[c + d x]}$$

$$\left(-\frac{2 (9 A - C) \operatorname{Cos}[d x] \operatorname{Csc}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}\right]}{5 d} + \frac{4 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^3 \left(3 A \operatorname{Sin}\left[\frac{d x}{2}\right] - 7 C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{15 d} + \frac{2 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^5 \left(A \operatorname{Sin}\left[\frac{d x}{2}\right] + C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{5 d} +\right.$$

$$\left.\frac{4 \operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right] \left(3 A \operatorname{Sin}\left[\frac{d x}{2}\right] + C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{3 d} + \frac{4 (3 A + C) \operatorname{Tan}\left[\frac{c}{2}\right]}{3 d} + \frac{4 (3 A - 7 C) \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^2 \operatorname{Tan}\left[\frac{c}{2}\right]}{15 d} + \frac{2 (A + C) \operatorname{Sec}\left[\frac{c}{2} + \frac{d x}{2}\right]^4 \operatorname{Tan}\left[\frac{c}{2}\right]}{5 d}\right)$$

- **Problem 1200: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{A + C \operatorname{Cos}[c + d x]^2}{(a + a \operatorname{Cos}[c + d x])^3 \sqrt{\operatorname{Sec}[c + d x]}} \, dx$$

Optimal (type 4, 220 leaves, 7 steps):

$$\frac{(A - 9 C) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{10 a^3 d} + \frac{(A + 3 C) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{6 a^3 d} -$$

$$\frac{(A + C) \operatorname{Sin}[c + d x]}{5 d (a + a \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^{3/2}} + \frac{2 (2 A - 3 C) \operatorname{Sin}[c + d x]}{15 a d (a + a \operatorname{Cos}[c + d x])^2 \sqrt{\operatorname{Sec}[c + d x]}} - \frac{(A - 9 C) \operatorname{Sin}[c + d x]}{10 d \left(a^3 + a^3 \operatorname{Cos}[c + d x]\right) \sqrt{\operatorname{Sec}[c + d x]}}$$

Result (type 5, 767 leaves):

$$\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]-\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}$$
$$9\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}\right]+\frac{2\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$
$$\frac{2\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+$$
$$\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(-\frac{2\,(A-9\,C)\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{5\,d}+\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]-9\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$
$$\left.\frac{8\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+6\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{4\,(A-9\,C)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{8\,(A+6\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 1201: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 218 leaves, 7 steps):

$$-\frac{(A-49\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}+\frac{(A-13\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}-$$
$$\frac{(A+C)\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{5/2}}+\frac{2\,(A-4\,C)\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{3/2}}+\frac{(A-13\,C)\,\text{Sin}[c+d\,x]}{6\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 793 leaves):

$$-\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$
$$\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+$$
$$\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}49\,\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]$$
$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+$$
$$\frac{2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}-$$
$$\frac{26\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{3\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}$$
$$\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{2\,(-A+39\,C+10\,C\,\mathrm{Cos}[2\,c])\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{5\,d}+\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}-\right.$$
$$\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(7\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+17\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+23\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}+$$
$$\left.\frac{16\,C\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}+\frac{4\,(A+23\,C)\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{4\,(7\,A+17\,C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 1202: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d\,x]^2}{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 4, 249 leaves, 8 steps) :

$$-\frac{(9\,A+119\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{10\,a^3\,d}+$$
$$\frac{(A+11\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{2\,a^3\,d}-\frac{(A+C)\,\mathrm{Sin}[c+d\,x]}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{7/2}}-$$
$$\frac{2\,C\,\mathrm{Sin}[c+d\,x]}{3\,a\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^2\,\mathrm{Sec}[c+d\,x]^{5/2}}-\frac{(9\,A+119\,C)\,\mathrm{Sin}[c+d\,x]}{30\,d\,\left(a^3+a^3\,\mathrm{Cos}[c+d\,x]\right)\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{(A+11\,C)\,\mathrm{Sin}[c+d\,x]}{2\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 5, 826 leaves) :

$$-\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}9\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\mathrm{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]-$$

$$\frac{1}{5\,d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}119\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\mathrm{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\mathrm{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},-e^{2\,i\,(c+d\,x)}\right]\right)\mathrm{Sec}\left[\frac{c}{2}\right]+$$

$$\frac{2\,A\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{22\,C\,\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\mathrm{Sec}\left[\frac{c}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c]}{d\,(a+a\,\mathrm{Cos}[c+d\,x])^3}+$$

$$\frac{1}{(a+a\,\mathrm{Cos}[c+d\,x])^3}\mathrm{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(\frac{2\,(9\,A+89\,C+30\,C\,\mathrm{Cos}[2\,c])\,\mathrm{Cos}[d\,x]\,\mathrm{Csc}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}\right]}{5\,d}+\frac{8\,C\,\mathrm{Cos}[2\,d\,x]\,\mathrm{Sin}[2\,c]}{3\,d}-\frac{2\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\right.$$

$$\frac{8\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(6\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+11\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}-\frac{4\,\mathrm{Sec}\left[\frac{c}{2}\right]\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(9\,A\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]+43\,C\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-\frac{48\,C\,\mathrm{Cos}[c]\,\mathrm{Sin}[d\,x]}{d}+$$

$$\left.\frac{8\,C\,\mathrm{Cos}[2\,c]\,\mathrm{Sin}[2\,d\,x]}{3\,d}-\frac{4\,(9\,A+43\,C)\,\mathrm{Tan}\left[\frac{c}{2}\right]}{3\,d}+\frac{8\,(6\,A+11\,C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\mathrm{Tan}\left[\frac{c}{2}\right]}{15\,d}-\frac{2\,(A+C)\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\mathrm{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 1203: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d\,x]^2}{(a+a\,\mathrm{Cos}[c+d\,x])^3\,\mathrm{Sec}[c+d\,x]^{7/2}}\,dx$$

Optimal (type 4, 290 leaves, 9 steps) :

$$\frac{7\,(7\,A+33\,C)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{10\,a^3\,d}-$$

$$\frac{(13\,A+63\,C)\,\sqrt{\text{Cos}[c+d\,x]}\;\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{6\,a^3\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3\,\text{Sec}[c+d\,x]^{9/2}}-$$

$$\frac{2\,(A+6\,C)\,\text{Sin}[c+d\,x]}{15\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^2\,\text{Sec}[c+d\,x]^{7/2}}-\frac{(13\,A+63\,C)\,\text{Sin}[c+d\,x]}{10\,d\,\left(a^3+a^3\,\text{Cos}[c+d\,x]\right)\,\text{Sec}[c+d\,x]^{5/2}}+\frac{7\,(7\,A+33\,C)\,\text{Sin}[c+d\,x]}{30\,a^3\,d\,\text{Sec}[c+d\,x]^{3/2}}-\frac{(13\,A+63\,C)\,\text{Sin}[c+d\,x]}{6\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 5, 870 leaves) :

$$\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}49\,\sqrt{2}\,A\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6$$

$$\text{Csc}\left[\frac{c}{2}\right]\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]+$$

$$\frac{1}{5\,d\,(a+a\,\text{Cos}[c+d\,x])^3}231\,\sqrt{2}\,C\,e^{-i\,(2\,c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\;\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\text{Csc}\left[\frac{c}{2}\right]$$

$$\left(1+e^{2\,i\,(c+d\,x)}+\left(-1+e^{2\,i\,c}\right)\sqrt{1+e^{2\,i\,(c+d\,x)}}\;\text{Hypergeometric2F1}\left[-\frac{1}{4},\,\frac{1}{2},\,\frac{3}{4},\,-e^{2\,i\,(c+d\,x)}\right]\right)\text{Sec}\left[\frac{c}{2}\right]-$$

$$\frac{26\,A\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{3\,d\,(a+a\,\text{Cos}[c+d\,x])^3}-$$

$$\frac{42\,C\,\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}\left[\frac{c}{2}\right]\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\text{Sec}\left[\frac{c}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c]}{d\,(a+a\,\text{Cos}[c+d\,x])^3}+\frac{1}{(a+a\,\text{Cos}[c+d\,x])^3}$$

$$\text{Cos}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^6\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{(78\,A+329\,C+20\,A\,\text{Cos}[2\,c]+133\,C\,\text{Cos}[2\,c])\,\text{Cos}[d\,x]\,\text{Csc}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}\right]}{5\,d}-\frac{8\,C\,\text{Cos}[2\,d\,x]\,\text{Sin}[2\,c]}{d}+\right.$$

$$\frac{4\,C\,\text{Cos}[3\,d\,x]\,\text{Sin}[3\,c]}{5\,d}+\frac{2\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{5\,d}+\frac{92\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\left(A\,\text{Sin}\left[\frac{d\,x}{2}\right]+3\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{3\,d}-$$

$$\frac{4\,\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\left(17\,A\,\text{Sin}\left[\frac{d\,x}{2}\right]+27\,C\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)}{15\,d}+\frac{4\,(20\,A+133\,C)\,\text{Cos}[c]\,\text{Sin}[d\,x]}{5\,d}-\frac{8\,C\,\text{Cos}[2\,c]\,\text{Sin}[2\,d\,x]}{d}+$$

$$\left.\frac{4\,C\,\text{Cos}[3\,c]\,\text{Sin}[3\,d\,x]}{5\,d}+\frac{92\,(A+3\,C)\,\text{Tan}\left[\frac{c}{2}\right]}{3\,d}-\frac{4\,(17\,A+27\,C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^2\text{Tan}\left[\frac{c}{2}\right]}{15\,d}+\frac{2\,(A+C)\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^4\text{Tan}\left[\frac{c}{2}\right]}{5\,d}\right)$$

- **Problem 1207: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 3, 136 leaves, 5 steps):

$$\frac{2\sqrt{a}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a\,A\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 3, 473 leaves):

$$\frac{1}{6\,d\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}}\,i\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}[c+d\,x]^{3/2}$$
$$\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)\left(6\,C\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\text{Cos}[c+d\,x]^2-\right.$$
$$3\,C\,\text{Cos}[2\,(c+d\,x)]\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]-$$
$$\left(\text{Cos}\left[\frac{d\,x}{2}\right]-i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)\left(3\,C\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,C\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$\left.\left.4\,i\sqrt{2}\,A\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)\right)$$

- **Problem 1208: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 137 leaves, 5 steps):

$$\frac{\sqrt{a}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}-$$
$$\frac{a\,(2\,A-C)\,\text{Sin}[c+d\,x]}{d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,A\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 620 leaves):

$$\frac{1}{4\,d\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}}\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(-i\,C\,\mathrm{Cos}\left[c+\frac{d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{i\,d\,x}\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]-\right.$$

$$i\,C\,\mathrm{Cos}\left[c+\frac{3\,d\,x}{2}\right]\mathrm{Log}\left[2\left(e^{i\,d\,x}\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]+$$

$$2\,i\,C\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right]\mathrm{Cos}[c+d\,x]\left(\mathrm{Cos}\left[\frac{d\,x}{2}\right]+i\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]\right)-$$

$$C\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[c+\frac{d\,x}{2}\right]+$$

$$8\sqrt{2}\,A\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$2\sqrt{2}\,C\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+2\sqrt{2}\,C\sqrt{\mathrm{Cos}[c+d\,x]\,(\mathrm{Cos}[d\,x]+i\,\mathrm{Sin}[d\,x])}\,\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+$$

$$\left.C\,\mathrm{Log}\left[2\left(e^{i\,d\,x}\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\mathrm{Sin}[c]}\right)\right]\mathrm{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 1209: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\sqrt{\mathrm{Sec}[c+d\,x]}\,dx$$

Optimal (type 3, 144 leaves, 5 steps):

$$\frac{\sqrt{a}\,(8\,A+3\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{4\,d}+\frac{a\,C\,\mathrm{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{C\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 489 leaves):

$$\frac{1}{8\sqrt{2}\, d\sqrt{\text{Sec}[c+d x]}\,\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}}\sqrt{a\,(1+\text{Cos}[c+d x])}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]$$
$$\left(-i\,(8 A+3 C)\,\text{Cos}\left[\frac{d x}{2}\right]\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$i\,(8 A+3 C)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\,\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$8 A\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$3 C\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$\left.4\sqrt{2}\,C\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+2\sqrt{2}\,C\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{3}{2}(c+d x)\right]\right)$$

- **Problem 1210: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d x]}\,\left(A+C\,\text{Cos}[c+d x]^2\right)}{\sqrt{\text{Sec}[c+d x]}}\,dx$$

Optimal (type 3, 189 leaves, 6 steps):

$$\frac{\sqrt{a}\,(8 A+5 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{8 d}+$$
$$\frac{a\,C\,\text{Sin}[c+d x]}{12 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}}+\frac{C\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{3 d\,\text{Sec}[c+d x]^{3/2}}+\frac{a\,(8 A+5 C)\,\text{Sin}[c+d x]}{8 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 573 leaves):

$$\frac{1}{48\sqrt{2}\, d\sqrt{\text{Sec}[c+d x]}\, \sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}} \sqrt{a\,(1+\text{Cos}[c+d x])}\; \text{Sec}\left[\frac{1}{2}(c+d x)\right]$$
$$\left(-3\,i\,(8 A+5 C)\,\text{Cos}\left[\frac{d x}{2}\right]\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]+\right.$$
$$3\,i\,(8 A+5 C)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d x}{2}\right]+i\,\text{Sin}\left[\frac{d x}{2}\right]\right)+$$
$$24 A\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$15 C\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d x}{2}\right]+$$
$$48\sqrt{2}\,A\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+28\sqrt{2}\,C\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{1}{2}(c+d x)\right]+$$
$$\left.6\sqrt{2}\,C\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{3}{2}(c+d x)\right]+4\sqrt{2}\,C\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\;\text{Sin}\left[\frac{5}{2}(c+d x)\right]\right)$$

- **Problem 1211: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+a\,\text{Cos}[c+d x]}\,\left(A+C\,\text{Cos}[c+d x]^2\right)}{\text{Sec}[c+d x]^{3/2}}\,dx$$

Optimal (type 3, 234 leaves, 7 steps):

$$\frac{\sqrt{a}\,(48 A+35 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{64 d}+\frac{a\,C\,\text{Sin}[c+d x]}{24 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{5/2}}+$$
$$\frac{C\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 d\,\text{Sec}[c+d x]^{5/2}}+\frac{a\,(48 A+35 C)\,\text{Sin}[c+d x]}{96 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}}+\frac{a\,(48 A+35 C)\,\text{Sin}[c+d x]}{64 d\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}$$

Result (type 3, 1065 leaves):

$$\frac{1}{128}(48A+35C)\sqrt{\text{Cos}[c+dx]}\,\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\sqrt{\text{Sec}[c+dx]}$$

$$\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{idx}{2}}\,\text{Log}\left[2\left(e^{idx}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-idx}\left(\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)-$$

$$\left(2\,i\,e^{\frac{idx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-idx}\left(\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{idx}{2}}\,\text{Log}\left[2\left(e^{idx}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{idx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-idx}\left(\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)+$$

$$\left(2\,i\,e^{\frac{idx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-idx}\left(\left(1+e^{2idx}\right)\text{Cos}[c]+i\left(-1+e^{2idx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2idx}\right)\text{Cos}[c]+2\,i\left(-1+e^{2idx}\right)\text{Sin}[c]}\right)\right)\right)+$$

$$\sqrt{a\,(1+\text{Cos}[c+dx])}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\sqrt{\text{Sec}[c+dx]}\left(-\frac{(48A+41C)\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{384\,d}+\frac{(12A+11C)\,\text{Cos}\left[\frac{3dx}{2}\right]\text{Sin}\left[\frac{3c}{2}\right]}{48\,d}+\right.$$

$$\frac{(16A+15C)\,\text{Cos}\left[\frac{5dx}{2}\right]\text{Sin}\left[\frac{5c}{2}\right]}{128\,d}+\frac{C\,\text{Cos}\left[\frac{7dx}{2}\right]\text{Sin}\left[\frac{7c}{2}\right]}{48\,d}+$$

$$\frac{C\,\text{Cos}\left[\frac{9dx}{2}\right]\text{Sin}\left[\frac{9c}{2}\right]}{64\,d}-\frac{(48A+41C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{384\,d}+$$

$$\frac{(12A+11C)\,\text{Cos}\left[\frac{3c}{2}\right]\text{Sin}\left[\frac{3dx}{2}\right]}{48\,d}+\frac{(16A+15C)\,\text{Cos}\left[\frac{5c}{2}\right]\text{Sin}\left[\frac{5dx}{2}\right]}{128\,d}+$$

$$\left.\frac{C\,\text{Cos}\left[\frac{7c}{2}\right]\text{Sin}\left[\frac{7dx}{2}\right]}{48\,d}+\frac{C\,\text{Cos}\left[\frac{9c}{2}\right]\text{Sin}\left[\frac{9dx}{2}\right]}{64\,d}\right)$$

- **Problem 1215: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+dx])^{3/2}\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^{7/2}\,dx$$

Optimal (type 3, 183 leaves, 6 steps):

$$\frac{2 a^{3/2}\, C\, \text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{d}+\frac{2 a^2\,(4 A+5 C)\,\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{5 d\,\sqrt{a+a\,\text{Cos}[c+d x]}}+$$
$$\frac{2 a A\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{5 d}+\frac{2 A\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{5 d}$$

Result (type 3, 824 leaves):

$$\frac{1}{20 d\,\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}}\,(a\,(1+\text{Cos}[c+d x]))^{3/2}\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^3\sqrt{\text{Sec}[c+d x]}$$
$$\left(5 C\, e^{-\frac{1}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\text{Cos}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right)\text{Cos}[c]-\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)+\right.$$
$$5 C\, e^{-\frac{1}{2} i d x}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]$$
$$\text{Sin}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right)\text{Cos}[c]-\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-5 i C\, e^{-\frac{1}{2} i d x}\,\text{Cos}\left[\frac{c}{2}\right]^2$$
$$\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)-$$
$$5 i C\, e^{-\frac{1}{2} i d x}\,\text{Log}\left[2\left(e^{i d x}\,\text{Cos}\left[\frac{c}{2}\right]+i\, e^{i d x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{c}{2}\right]^2$$
$$\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)+24 A\,\text{Cos}\left[\frac{c}{2}\right]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\,\text{Sin}\left[\frac{d x}{2}\right]+$$
$$20 C\,\text{Cos}\left[\frac{c}{2}\right]\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\,\text{Sin}\left[\frac{d x}{2}\right]+24\sqrt{2}\,A\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}+$$
$$20\sqrt{2}\,C\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}+12\sqrt{2}\,A\,\text{Sec}[c+d x]\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}$$
$$\left.\text{Sin}\left[\frac{1}{2}(c+d x)\right]+4\sqrt{2}\,A\,\text{Sec}[c+d x]^2\sqrt{\text{Cos}[c+d x]\,(\text{Cos}[d x]+i\,\text{Sin}[d x])}\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 1216: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d x])^{3/2}\left(A+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^{5/2}\,dx$$

Optimal (type 3, 181 leaves, 6 steps):

$$\frac{3 a^{3/2}\, C\, \text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{d}-\frac{a^2\,(8 A-3 C)\,\text{Sin}[c+d x]}{3 d\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}+$$
$$\frac{2 a A\,\sqrt{a+a\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{d}+\frac{2 A\,(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{3 d}$$

Result (type 3, 869 leaves):

$$\frac{1}{24 d \sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]}}(a(1+\mathrm{Cos}[c+d x]))^{3/2} \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^3 \sqrt{\mathrm{Sec}[c+d x]}$$

$$\left(9 C e^{-\frac{1}{2} i d x} \mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i \mathrm{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]}\right] \mathrm{Cos}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]-\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)+\right.$$
$$9 C e^{-\frac{1}{2} i d x} \mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i \mathrm{Sin}\left[\frac{c}{2}\right]\right) \sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]}\right]$$
$$\mathrm{Sin}\left[\frac{c}{2}\right]^2\left(i\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]-\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)-9 i C e^{-\frac{1}{2} i d x} \mathrm{Cos}\left[\frac{c}{2}\right]^2$$
$$\mathrm{Log}\left[2\left(e^{i d x} \mathrm{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]}\right)\right]\left(\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)-$$
$$9 i C e^{-\frac{1}{2} i d x} \mathrm{Log}\left[2\left(e^{i d x} \mathrm{Cos}\left[\frac{c}{2}\right]+i e^{i d x} \mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]}\right)\right] \mathrm{Sin}\left[\frac{c}{2}\right]^2$$
$$\left(\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]\right)+40 A \mathrm{Cos}\left[\frac{c}{2}\right] \sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]} \mathrm{Sin}\left[\frac{d x}{2}\right]-$$
$$6 C \mathrm{Cos}\left[\frac{c}{2}\right] \sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]} \mathrm{Sin}\left[\frac{d x}{2}\right]+40 \sqrt{2} A \mathrm{Cos}\left[\frac{d x}{2}\right] \mathrm{Sin}\left[\frac{c}{2}\right] \sqrt{\mathrm{Cos}[c+d x](\mathrm{Cos}[d x]+i \mathrm{Sin}[d x])}-$$
$$6 \sqrt{2} C \mathrm{Cos}\left[\frac{d x}{2}\right] \mathrm{Sin}\left[\frac{c}{2}\right] \sqrt{\mathrm{Cos}[c+d x](\mathrm{Cos}[d x]+i \mathrm{Sin}[d x])}+6 \sqrt{2} C \mathrm{Cos}\left[\frac{3 d x}{2}\right] \mathrm{Sin}\left[\frac{3 c}{2}\right] \sqrt{\mathrm{Cos}[c+d x](\mathrm{Cos}[d x]+i \mathrm{Sin}[d x])}+$$
$$6 C \mathrm{Cos}\left[\frac{3 c}{2}\right] \sqrt{\left(1+e^{2 i d x}\right) \mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right) \mathrm{Sin}[c]} \mathrm{Sin}\left[\frac{3 d x}{2}\right]+$$
$$\left.8 \sqrt{2} A \mathrm{Sec}[c+d x] \sqrt{\mathrm{Cos}[c+d x](\mathrm{Cos}[d x]+i \mathrm{Sin}[d x])} \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]\right)$$

- **Problem 1217: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a \mathrm{Cos}[c+d x])^{3/2}\left(A+C \mathrm{Cos}[c+d x]^2\right) \mathrm{Sec}[c+d x]^{3/2} \, dx$$

Optimal (type 3, 195 leaves, 6 steps):

$$\frac{a^{3/2}(8 A+7 C) \mathrm{ArcSin}\left[\frac{\sqrt{a} \mathrm{Sin}[c+d x]}{\sqrt{a+a \mathrm{Cos}[c+d x]}}\right] \sqrt{\mathrm{Cos}[c+d x]} \sqrt{\mathrm{Sec}[c+d x]}}{4 d}-\frac{a^2(8 A-5 C) \mathrm{Sin}[c+d x]}{4 d \sqrt{a+a \mathrm{Cos}[c+d x]} \sqrt{\mathrm{Sec}[c+d x]}}-$$
$$\frac{a(4 A-C) \sqrt{a+a \mathrm{Cos}[c+d x]} \mathrm{Sin}[c+d x]}{2 d \sqrt{\mathrm{Sec}[c+d x]}}+\frac{2 A(a+a \mathrm{Cos}[c+d x])^{3/2} \sqrt{\mathrm{Sec}[c+d x]} \mathrm{Sin}[c+d x]}{d}$$

Result (type 3, 927 leaves):

$$\frac{1}{16\,d\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}}\,a\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(-i\,(8\,A+7\,C)\,\text{Cos}\left[c+\frac{d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]-\right.$$

$$8\,i\,A\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]-$$

$$7\,i\,C\,\text{Cos}\left[c+\frac{3\,d\,x}{2}\right]\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+$$

$$2\,i\,(8\,A+7\,C)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\text{Cos}[c+d\,x]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)-$$

$$8\,A\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[c+\frac{d\,x}{2}\right]-$$

$$7\,C\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[c+\frac{d\,x}{2}\right]+$$

$$32\sqrt{2}\,A\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]-10\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$12\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+2\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]+$$

$$8\,A\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]+$$

$$\left.7\,C\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[c+\frac{3\,d\,x}{2}\right]\right)$$

- **Problem 1218: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 3, 191 leaves, 6 steps):

$$\frac{a^{3/2}\,(24\,A+11\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{8\,d}+$$

$$\frac{a^2\,(24\,A+19\,C)\,\text{Sin}[c+d\,x]}{24\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,C\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\sqrt{\text{Sec}[c+d\,x]}}+\frac{C\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 574 leaves):

$$\frac{1}{48\sqrt{2}\,d\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}}\,a\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]$$
$$\Bigg(-3\,i\,(24\,A+11\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]+$$
$$3\,i\,(24\,A+11\,C)\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{d\,x}{2}\right]+i\,\text{Sin}\left[\frac{d\,x}{2}\right]\right)+$$
$$72\,A\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$33\,C\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\text{Sin}\left[\frac{d\,x}{2}\right]+$$
$$48\sqrt{2}\,A\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+52\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+$$
$$18\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+4\sqrt{2}\,C\sqrt{\text{Cos}[c+d\,x]\,(\text{Cos}[d\,x]+i\,\text{Sin}[d\,x])}\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\Bigg)$$

- **Problem 1219: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 238 leaves, 7 steps):

$$\frac{a^{3/2}\,(112\,A+75\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{64\,d}+\frac{a^2\,(16\,A+13\,C)\,\text{Sin}[c+d\,x]}{32\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+$$
$$\frac{a\,C\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{8\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{C\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{4\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a^2\,(112\,A+75\,C)\,\text{Sin}[c+d\,x]}{64\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 1069 leaves):

$$\frac{1}{256}(112A+75C)\sqrt{\cos[c+dx]}\,(a(1+\cos[c+dx]))^{3/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\sec[c+dx]}$$
$$\left(\frac{1}{2}\,i\,\sin\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{idx}{2}}\,\mathrm{Log}\left[2\left(e^{idx}\cos\left[\frac{c}{2}\right]+i\,e^{idx}\sin\left[\frac{c}{2}\right]+\sqrt{(1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]}\right)\right]\left(\cos\left[\frac{c}{2}\right]-i\sin\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-idx}\left((1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\cos[c]+2\,i\,(-1+e^{2idx})\sin[c]}\right)-$$
$$\left(2\,i\,e^{\frac{idx}{2}}\,\mathrm{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]}\right]\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-idx}\left((1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\cos[c]+2\,i\,(-1+e^{2idx})\sin[c]}\right)\right)+$$
$$\frac{1}{2}\cos\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{idx}{2}}\,\mathrm{Log}\left[2\left(e^{idx}\cos\left[\frac{c}{2}\right]+i\,e^{idx}\sin\left[\frac{c}{2}\right]+\sqrt{(1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]}\right)\right]\left(\cos\left[\frac{c}{2}\right]-i\sin\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-idx}\left((1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\cos[c]+2\,i\,(-1+e^{2idx})\sin[c]}\right)+$$
$$\left(2\,i\,e^{\frac{idx}{2}}\,\mathrm{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\sqrt{(1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]}\right]\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-idx}\left((1+e^{2idx})\cos[c]+i\,(-1+e^{2idx})\sin[c]\right)}\right)\Big/\left(d\sqrt{2\,(1+e^{2idx})\cos[c]+2\,i\,(-1+e^{2idx})\sin[c]}\right)\right)\right)+$$
$$(a(1+\cos[c+dx]))^{3/2}\sec\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\sec[c+dx]}\left(-\frac{(80A+43C)\cos\left[\frac{dx}{2}\right]\sin\left[\frac{c}{2}\right]}{256\,d}+\frac{3\,(4A+3C)\cos\left[\frac{3dx}{2}\right]\sin\left[\frac{3c}{2}\right]}{32\,d}+\right.$$
$$\frac{(16A+23C)\cos\left[\frac{5dx}{2}\right]\sin\left[\frac{5c}{2}\right]}{256\,d}+\frac{C\cos\left[\frac{7dx}{2}\right]\sin\left[\frac{7c}{2}\right]}{32\,d}+$$
$$\frac{C\cos\left[\frac{9dx}{2}\right]\sin\left[\frac{9c}{2}\right]}{128\,d}-\frac{(80A+43C)\cos\left[\frac{c}{2}\right]\sin\left[\frac{dx}{2}\right]}{256\,d}+$$
$$\frac{3\,(4A+3C)\cos\left[\frac{3c}{2}\right]\sin\left[\frac{3dx}{2}\right]}{32\,d}+\frac{(16A+23C)\cos\left[\frac{5c}{2}\right]\sin\left[\frac{5dx}{2}\right]}{256\,d}+$$
$$\left.\frac{C\cos\left[\frac{7c}{2}\right]\sin\left[\frac{7dx}{2}\right]}{32\,d}+\frac{C\cos\left[\frac{9c}{2}\right]\sin\left[\frac{9dx}{2}\right]}{128\,d}\right)$$

- **Problem 1220: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\cos[c+dx])^{3/2}\left(A+C\cos[c+dx]^2\right)}{\sec[c+dx]^{3/2}}\,dx$$

Optimal (type 3, 285 leaves, 8 steps):

$$\frac{a^{3/2}\,(176\,A+133\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{128\,d}+$$

$$\frac{a^2\,(80\,A+67\,C)\,\text{Sin}[c+d\,x]}{240\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}}+\frac{3\,a\,C\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{40\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{C\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{5/2}}+$$

$$\frac{a^2\,(176\,A+133\,C)\,\text{Sin}[c+d\,x]}{192\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a^2\,(176\,A+133\,C)\,\text{Sin}[c+d\,x]}{128\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 1123 leaves) :

$$\frac{1}{512}(176 A+133 C)\sqrt{\cos[c+d x]}\,(a(1+\cos[c+d x]))^{3/2}\sec\left[\frac{c}{2}+\frac{d x}{2}\right]^3\sqrt{\sec[c+d x]}$$

$$\left(\frac{1}{2}\,i \sin\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i d x}{2}}\operatorname{Log}\left[2\left(e^{i d x}\cos\left[\frac{c}{2}\right]+i\,e^{i d x}\sin\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right]\left(\cos\left[\frac{c}{2}\right]-i\sin\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)-$$

$$\left(2\,i\,e^{\frac{i d x}{2}}\operatorname{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right]\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right)+$$

$$\frac{1}{2}\cos\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i d x}{2}}\operatorname{Log}\left[2\left(e^{i d x}\cos\left[\frac{c}{2}\right]+i\,e^{i d x}\sin\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right]\left(\cos\left[\frac{c}{2}\right]-i\sin\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)+$$

$$\left(2\,i\,e^{\frac{i d x}{2}}\operatorname{ArcTanh}\left[\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]}\right]\left(\cos\left[\frac{c}{2}\right]+i\sin\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\cos[c]+i\left(-1+e^{2 i d x}\right)\sin[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\cos[c]+2\,i\left(-1+e^{2 i d x}\right)\sin[c]}\right)\right)\right)+$$

$$(a(1+\cos[c+d x]))^{3/2}\sec\left[\frac{c}{2}+\frac{d x}{2}\right]^3\sqrt{\sec[c+d x]}\left(-\frac{(1360 A+1019 C)\cos\left[\frac{d x}{2}\right]\sin\left[\frac{c}{2}\right]}{7680\, d}+\right.$$

$$\frac{(280 A+239 C)\cos\left[\frac{3 d x}{2}\right]\sin\left[\frac{3 c}{2}\right]}{960\, d}+$$

$$\frac{(48 A+49 C)\cos\left[\frac{5 d x}{2}\right]\sin\left[\frac{5 c}{2}\right]}{512\, d}+\frac{(10 A+17 C)\cos\left[\frac{7 d x}{2}\right]\sin\left[\frac{7 c}{2}\right]}{480\, d}+$$

$$\frac{3 C\cos\left[\frac{9 d x}{2}\right]\sin\left[\frac{9 c}{2}\right]}{256\, d}+\frac{C\cos\left[\frac{11 d x}{2}\right]\sin\left[\frac{11 c}{2}\right]}{320\, d}-$$

$$\frac{(1360 A+1019 C)\cos\left[\frac{c}{2}\right]\sin\left[\frac{d x}{2}\right]}{7680\, d}+\frac{(280 A+239 C)\cos\left[\frac{3 c}{2}\right]\sin\left[\frac{3 d x}{2}\right]}{960\, d}+$$

$$\frac{(48 A+49 C)\cos\left[\frac{5 c}{2}\right]\sin\left[\frac{5 d x}{2}\right]}{512\, d}+\frac{(10 A+17 C)\cos\left[\frac{7 c}{2}\right]\sin\left[\frac{7 d x}{2}\right]}{480\, d}+$$

$$\left.\frac{3 C\cos\left[\frac{9 c}{2}\right]\sin\left[\frac{9 d x}{2}\right]}{256\, d}+\frac{C\cos\left[\frac{11 c}{2}\right]\sin\left[\frac{11 d x}{2}\right]}{320\, d}\right)$$

- **Problem 1224: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\cos[c+d x])^{5/2}\left(A+C\cos[c+d x]^2\right)\sec[c+d x]^{9/2}\,dx$$

Optimal (type 3, 230 leaves, 7 steps):

$$\frac{2 a^{5/2} C \,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}{d}+$$

$$\frac{2 a^3 (32 A+49 C)\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{21 d\sqrt{a+a\,\text{Cos}[c+d x]}}+\frac{2 a^2 (8 A+7 C)\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sec}[c+d x]^{3/2}\,\text{Sin}[c+d x]}{21 d}+$$

$$\frac{2 a A (a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sec}[c+d x]^{5/2}\,\text{Sin}[c+d x]}{7 d}+\frac{2 A (a+a\,\text{Cos}[c+d x])^{5/2}\,\text{Sec}[c+d x]^{7/2}\,\text{Sin}[c+d x]}{7 d}$$

Result (type 3, 975 leaves):

$$\begin{aligned}
&\frac{1}{4} C\sqrt{\text{Cos}[c+d x]}\,(a\,(1+\text{Cos}[c+d x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}\\
&\quad\left(\frac{1}{2} i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2 i e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.\\
&\qquad\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)-\\
&\qquad\left(2 i e^{\frac{i d x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\\
&\qquad\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right)+\\
&\quad\frac{1}{2}\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2 i e^{\frac{i d x}{2}}\,\text{Log}\left[2\left(e^{i d x}\text{Cos}\left[\frac{c}{2}\right]+i e^{i d x}\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\\
&\qquad\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)+\\
&\qquad\left(2 i e^{\frac{i d x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\\
&\qquad\left.\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\text{Cos}[c]+i\left(-1+e^{2 i d x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\text{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\text{Sin}[c]}\right)\right)\right)+\\
&(a\,(1+\text{Cos}[c+d x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}\left(\frac{(23 A+28 C)\,\text{Cos}\left[\frac{d x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{21 d}+\frac{(23 A+28 C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d x}{2}\right]}{21 d}+\right.\\
&\quad\frac{2 A\,\text{Sec}[c+d x]^2\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{7 d}+\frac{A\,\text{Sec}[c+d x]^3\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{14 d}+\\
&\quad\left.\frac{\text{Sec}[c+d x]\left(23 A\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]+7 C\,\text{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]\right)}{42 d}\right)
\end{aligned}$$

- **Problem 1225: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a+a\,\text{Cos}[c+d x])^{5/2}\left(A+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^{7/2}\,dx$$

Optimal (type 3, 230 leaves, 7 steps):

$$\frac{5\,a^{5/2}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}-\frac{a^3\,(64\,A+15\,C)\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,a^2\,(8\,A+5\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,d}+\frac{2\,a\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 3, 969 leaves):

$$\frac{5}{8}\,C\,\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}$$
$$\Bigg(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\Bigg(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\Bigg)+$$
$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\Bigg(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\Bigg)\Bigg)+$$
$$(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}\left(\frac{(172\,A+45\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{120\,d}+\frac{C\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{8\,d}+\right.$$
$$\frac{(172\,A+45\,C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{120\,d}+\frac{C\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{8\,d}+$$
$$\left.\frac{7\,A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{15\,d}+\frac{A\,\text{Sec}[c+d\,x]^2\,\text{Sin}\left[\frac{c}{2}+\frac{d\,x}{2}\right]}{10\,d}\right)$$

- **Problem 1226: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{5/2}\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 3, 238 leaves, 7 steps):

$$\frac{a^{5/2}\,(8A+19C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{4d}-\frac{a^3\,(56A-27C)\,\text{Sin}[c+dx]}{12d\sqrt{a+a\,\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}-\frac{a^2\,(8A-C)\,\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{2d\sqrt{\text{Sec}[c+dx]}}+\frac{10aA\,(a+a\,\text{Cos}[c+dx])^{3/2}\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{3d}+\frac{2A\,(a+a\,\text{Cos}[c+dx])^{5/2}\,\text{Sec}[c+dx]^{3/2}\,\text{Sin}[c+dx]}{3d}$$

Result (type 3, 988 leaves):

$$\frac{1}{32}(8A+19C)\sqrt{\text{Cos}[c+dx]}\,(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\text{Sec}[c+dx]}$$
$$\left(\frac{1}{2}\,\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}dx}{2}}\,\text{Log}\left[2\left(e^{\mathrm{i}dx}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}dx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-\mathrm{i}dx}\left(\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}dx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-\mathrm{i}dx}\left(\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}dx}{2}}\,\text{Log}\left[2\left(e^{\mathrm{i}dx}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}dx}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-\mathrm{i}dx}\left(\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}dx}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-\mathrm{i}dx}\left(\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\sqrt{2\left(1+e^{2\mathrm{i}dx}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\mathrm{i}dx}\right)\text{Sin}[c]}\right)\right)\right)+$$
$$(a\,(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\text{Sec}[c+dx]}\left(\frac{(128A-27C)\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{96d}+\frac{5C\,\text{Cos}\left[\frac{3dx}{2}\right]\text{Sin}\left[\frac{3c}{2}\right]}{16d}+\right.$$
$$\frac{C\,\text{Cos}\left[\frac{5dx}{2}\right]\text{Sin}\left[\frac{5c}{2}\right]}{32d}+\frac{(128A-27C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{96d}+$$
$$\left.\frac{5C\,\text{Cos}\left[\frac{3c}{2}\right]\text{Sin}\left[\frac{3dx}{2}\right]}{16d}+\frac{C\,\text{Cos}\left[\frac{5c}{2}\right]\text{Sin}\left[\frac{5dx}{2}\right]}{32d}+\frac{A\,\text{Sec}[c+dx]\,\text{Sin}\left[\frac{c}{2}+\frac{dx}{2}\right]}{6d}\right)$$

- **Problem 1227: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+dx])^{5/2}\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^{3/2}\,dx$$

Optimal (type 3, 242 leaves, 7 steps) :

$$\frac{5\,a^{5/2}\,(8\,A+5\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{8\,d}-\frac{a^3\,(24\,A-49\,C)\,\text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{a^2\,(8\,A-3\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{a\,(6\,A-C)\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 3, 1015 leaves) :

$$\frac{5}{64}\,(8\,A+5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(\frac{1}{2}\,i\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)+$$
$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\left[2\left(e^{i\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)+$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+i\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$
$$\left.\left.\left.\sqrt{e^{-i\,d\,x}\left(\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,i\,d\,x}\right)\text{Cos}[c]+2\,i\left(-1+e^{2\,i\,d\,x}\right)\text{Sin}[c]}\right)\right)\right)+$$
$$(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}\left(\frac{(72\,A-47\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{192\,d}+\frac{(3\,A+8\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{24\,d}+\right.$$
$$\frac{5\,C\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\text{Sin}\left[\frac{5\,c}{2}\right]}{64\,d}+\frac{C\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\text{Sin}\left[\frac{7\,c}{2}\right]}{96\,d}+$$
$$\frac{(72\,A-47\,C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{d\,x}{2}\right]}{192\,d}+\frac{(3\,A+8\,C)\,\text{Cos}\left[\frac{3\,c}{2}\right]\text{Sin}\left[\frac{3\,d\,x}{2}\right]}{24\,d}+$$
$$\left.\frac{5\,C\,\text{Cos}\left[\frac{5\,c}{2}\right]\text{Sin}\left[\frac{5\,d\,x}{2}\right]}{64\,d}+\frac{C\,\text{Cos}\left[\frac{7\,c}{2}\right]\text{Sin}\left[\frac{7\,d\,x}{2}\right]}{96\,d}\right)$$

- **Problem 1228: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int (a + a \operatorname{Cos}[c + d x])^{5/2} \left(A + C \operatorname{Cos}[c + d x]^2\right) \sqrt{\operatorname{Sec}[c + d x]} \, dx$$

Optimal (type 3, 238 leaves, 7 steps):

$$\frac{a^{5/2} (304 A + 163 C) \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c + d x]} \sqrt{\operatorname{Sec}[c + d x]}}{64 d} + \frac{a^3 (432 A + 299 C) \operatorname{Sin}[c + d x]}{192 d \sqrt{a + a \operatorname{Cos}[c + d x]} \sqrt{\operatorname{Sec}[c + d x]}} +$$
$$\frac{a^2 (16 A + 17 C) \sqrt{a + a \operatorname{Cos}[c + d x]} \operatorname{Sin}[c + d x]}{32 d \sqrt{\operatorname{Sec}[c + d x]}} + \frac{5 a C (a + a \operatorname{Cos}[c + d x])^{3/2} \operatorname{Sin}[c + d x]}{24 d \sqrt{\operatorname{Sec}[c + d x]}} + \frac{C (a + a \operatorname{Cos}[c + d x])^{5/2} \operatorname{Sin}[c + d x]}{4 d \sqrt{\operatorname{Sec}[c + d x]}}$$

Result (type 3, 1069 leaves):

$$\begin{aligned}
&\frac{1}{512}(304\,A+163\,C)\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\sqrt{\text{Sec}[c+d\,x]}\\
&\quad\Bigg(\frac{1}{2}\,i\,\text{Sin}\Big[\frac{c}{2}\Big]\Bigg(-\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\Big[2\Big(e^{i\,d\,x}\,\text{Cos}\Big[\frac{c}{2}\Big]+i\,e^{i\,d\,x}\,\text{Sin}\Big[\frac{c}{2}\Big]+\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Big)\Big]\Big(\text{Cos}\Big[\frac{c}{2}\Big]-i\,\text{Sin}\Big[\frac{c}{2}\Big]\Big)\\
&\qquad\quad\sqrt{e^{-i\,d\,x}\,\big((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\big)}\Bigg)\Bigg/\Bigg(d\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Bigg)-\\
&\qquad\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\Big[\Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\,\text{Sin}\Big[\frac{c}{2}\Big]\Big)\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Big]\Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\,\text{Sin}\Big[\frac{c}{2}\Big]\Big)\\
&\qquad\quad\sqrt{e^{-i\,d\,x}\,\big((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\big)}\Bigg)\Bigg/\Bigg(d\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Bigg)\Bigg)+\\
&\quad\frac{1}{2}\,\text{Cos}\Big[\frac{c}{2}\Big]\Bigg(-\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{Log}\Big[2\Big(e^{i\,d\,x}\,\text{Cos}\Big[\frac{c}{2}\Big]+i\,e^{i\,d\,x}\,\text{Sin}\Big[\frac{c}{2}\Big]+\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Big)\Big]\Big(\text{Cos}\Big[\frac{c}{2}\Big]-i\,\text{Sin}\Big[\frac{c}{2}\Big]\Big)\\
&\qquad\quad\sqrt{e^{-i\,d\,x}\,\big((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\big)}\Bigg)\Bigg/\Bigg(d\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Bigg)+\\
&\qquad\Bigg(2\,i\,e^{\frac{i\,d\,x}{2}}\,\text{ArcTanh}\Big[\Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\,\text{Sin}\Big[\frac{c}{2}\Big]\Big)\sqrt{(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Big]\Big(\text{Cos}\Big[\frac{c}{2}\Big]+i\,\text{Sin}\Big[\frac{c}{2}\Big]\Big)\\
&\qquad\quad\sqrt{e^{-i\,d\,x}\,\big((1+e^{2\,i\,d\,x})\,\text{Cos}[c]+i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]\big)}\Bigg)\Bigg/\Bigg(d\sqrt{2\,(1+e^{2\,i\,d\,x})\,\text{Cos}[c]+2\,i\,(-1+e^{2\,i\,d\,x})\,\text{Sin}[c]}\Bigg)\Bigg)\Bigg)+\\
&(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\Big[\frac{c}{2}+\frac{d\,x}{2}\Big]^5\sqrt{\text{Sec}[c+d\,x]}\,\Bigg(-\frac{(432\,A+265\,C)\,\text{Cos}\big[\frac{d\,x}{2}\big]\,\text{Sin}\big[\frac{c}{2}\big]}{1536\,d}+\frac{5\,(12\,A+11\,C)\,\text{Cos}\big[\frac{3\,d\,x}{2}\big]\,\text{Sin}\big[\frac{3\,c}{2}\big]}{192\,d}+\\
&\quad\frac{(16\,A+47\,C)\,\text{Cos}\big[\frac{5\,d\,x}{2}\big]\,\text{Sin}\big[\frac{5\,c}{2}\big]}{512\,d}+\frac{5\,C\,\text{Cos}\big[\frac{7\,d\,x}{2}\big]\,\text{Sin}\big[\frac{7\,c}{2}\big]}{192\,d}+\\
&\quad\frac{C\,\text{Cos}\big[\frac{9\,d\,x}{2}\big]\,\text{Sin}\big[\frac{9\,c}{2}\big]}{256\,d}-\frac{(432\,A+265\,C)\,\text{Cos}\big[\frac{c}{2}\big]\,\text{Sin}\big[\frac{d\,x}{2}\big]}{1536\,d}+\\
&\quad\frac{5\,(12\,A+11\,C)\,\text{Cos}\big[\frac{3\,c}{2}\big]\,\text{Sin}\big[\frac{3\,d\,x}{2}\big]}{192\,d}+\frac{(16\,A+47\,C)\,\text{Cos}\big[\frac{5\,c}{2}\big]\,\text{Sin}\big[\frac{5\,d\,x}{2}\big]}{512\,d}+\\
&\quad\frac{5\,C\,\text{Cos}\big[\frac{7\,c}{2}\big]\,\text{Sin}\big[\frac{7\,d\,x}{2}\big]}{192\,d}+\frac{C\,\text{Cos}\big[\frac{9\,c}{2}\big]\,\text{Sin}\big[\frac{9\,d\,x}{2}\big]}{256\,d}\Bigg)
\end{aligned}$$

- **Problem 1229: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\big(A+C\,\text{Cos}[c+d\,x]^2\big)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 285 leaves, 8 steps):

$$\frac{a^{5/2}\,(400\,A+283\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{128\,d}+$$

$$\frac{a^3\,(1040\,A+787\,C)\,\text{Sin}[c+d\,x]}{960\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a^2\,(80\,A+79\,C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{240\,d\,\text{Sec}[c+d\,x]^{3/2}}+$$

$$\frac{a\,C\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{8\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{C\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a^3\,(400\,A+283\,C)\,\text{Sin}[c+d\,x]}{128\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 1123 leaves) :

$$\frac{1}{1024}\,(400\,A+283\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(\frac{1}{2}\,\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right)-$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right)\right)+$$

$$\frac{1}{2}\,\text{Cos}\left[\frac{c}{2}\right]\left(-\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{Log}\left[2\left(e^{\mathrm{i}\,d\,x}\,\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,e^{\mathrm{i}\,d\,x}\,\text{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right)\right]\left(\text{Cos}\left[\frac{c}{2}\right]-\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right)+$$

$$\left(2\,\mathrm{i}\,e^{\frac{\mathrm{i}\,d\,x}{2}}\,\text{ArcTanh}\left[\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right]\left(\text{Cos}\left[\frac{c}{2}\right]+\mathrm{i}\,\text{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\left.\sqrt{e^{-\mathrm{i}\,d\,x}\left(\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\left(1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Cos}[c]+2\,\mathrm{i}\left(-1+e^{2\,\mathrm{i}\,d\,x}\right)\text{Sin}[c]}\right)\right)\right)+$$

$$(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}\left(-\frac{(3760\,A+2309\,C)\,\text{Cos}\left[\frac{d\,x}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{15\,360\,d}+\right.$$

$$\frac{(640\,A+509\,C)\,\text{Cos}\left[\frac{3\,d\,x}{2}\right]\text{Sin}\left[\frac{3\,c}{2}\right]}{1920\,d}+$$

$$\frac{5\,(16\,A+19\,C)\,\text{Cos}\left[\frac{5\,d\,x}{2}\right]\text{Sin}\left[\frac{5\,c}{2}\right]}{1024\,d}+$$

$$\frac{(5\,A+16\,C)\,\text{Cos}\left[\frac{7\,d\,x}{2}\right]\text{Sin}\left[\frac{7\,c}{2}\right]}{480\,d}+$$

$$\frac{5\,C\,\text{Cos}\left[\frac{9\,d\,x}{2}\right]\text{Sin}\left[\frac{9\,c}{2}\right]}{512\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{11\,d\,x}{2}\right]\,\mathrm{Sin}\left[\frac{11\,c}{2}\right]}{640\,d}-\frac{(3760\,A+2309\,C)\,\mathrm{Cos}\left[\frac{c}{2}\right]\,\mathrm{Sin}\left[\frac{d\,x}{2}\right]}{15\,360\,d}+\frac{(640\,A+509\,C)\,\mathrm{Cos}\left[\frac{3\,c}{2}\right]\,\mathrm{Sin}\left[\frac{3\,d\,x}{2}\right]}{1920\,d}+\frac{5\,(16\,A+19\,C)\,\mathrm{Cos}\left[\frac{5\,c}{2}\right]\,\mathrm{Sin}\left[\frac{5\,d\,x}{2}\right]}{1024\,d}+\frac{(5\,A+16\,C)\,\mathrm{Cos}\left[\frac{7\,c}{2}\right]\,\mathrm{Sin}\left[\frac{7\,d\,x}{2}\right]}{480\,d}+\frac{5\,C\,\mathrm{Cos}\left[\frac{9\,c}{2}\right]\,\mathrm{Sin}\left[\frac{9\,d\,x}{2}\right]}{512\,d}+\frac{C\,\mathrm{Cos}\left[\frac{11\,c}{2}\right]\,\mathrm{Sin}\left[\frac{11\,d\,x}{2}\right]}{640\,d}\Bigg)$$

- **Problem 1230: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 332 leaves, 9 steps):

$$\frac{a^{5/2}\,(1304\,A+1015\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{512\,d}+\frac{a^3\,(136\,A+109\,C)\,\mathrm{Sin}[c+d\,x]}{192\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a^2\,(24\,A+23\,C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{96\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a\,C\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{12\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{C\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{6\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a^3\,(1304\,A+1015\,C)\,\mathrm{Sin}[c+d\,x]}{768\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{a^3\,(1304\,A+1015\,C)\,\mathrm{Sin}[c+d\,x]}{512\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 3, 1177 leaves):

$$\frac{1}{4096}\,(1304\,A+1015\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\sqrt{\mathrm{Sec}[c+d\,x]}$$
$$\left(\frac{1}{2}\,i\,\mathrm{Sin}\left[\frac{c}{2}\right]\,\left(-\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{Log}\left[2\,\left(e^{i\,d\,x}\,\mathrm{Cos}\left[\frac{c}{2}\right]+i\,e^{i\,d\,x}\,\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)\right]\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.\right.$$
$$\left.\sqrt{e^{-i\,d\,x}\,\left(\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]\right)}\right)\Big/\left(d\,\sqrt{2\,\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+2\,i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right)-$$
$$\left(2\,i\,e^{\frac{i\,d\,x}{2}}\,\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\,\sqrt{\left(1+e^{2\,i\,d\,x}\right)\,\mathrm{Cos}[c]+i\,\left(-1+e^{2\,i\,d\,x}\right)\,\mathrm{Sin}[c]}\right]\,\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)}\Bigg/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\Bigg)+$$

$$\frac{1}{2}\mathrm{Cos}\left[\frac{c}{2}\right]\left(-\left(2 i e^{\frac{i d x}{2}}\mathrm{Log}\left[2\left(e^{i d x}\mathrm{Cos}\left[\frac{c}{2}\right]+i e^{i d x}\mathrm{Sin}\left[\frac{c}{2}\right]+\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]-i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.\right.$$

$$\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)}\right)\Bigg/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)+$$

$$\left(2 i e^{\frac{i d x}{2}}\mathrm{ArcTanh}\left[\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\sqrt{\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right]\left(\mathrm{Cos}\left[\frac{c}{2}\right]+i\,\mathrm{Sin}\left[\frac{c}{2}\right]\right)\right.$$

$$\left.\left.\sqrt{e^{-i d x}\left(\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]\right)}\right)\Bigg/\left(d\sqrt{2\left(1+e^{2 i d x}\right)\mathrm{Cos}[c]+2 i\left(-1+e^{2 i d x}\right)\mathrm{Sin}[c]}\right)\right)\right)+$$

$$(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d x]}\left(-\frac{(2120 A+1589 C)\,\mathrm{Cos}\left[\frac{d x}{2}\right]\mathrm{Sin}\left[\frac{c}{2}\right]}{12\,288\,d}+\right.$$

$$\frac{11\,(20 A+17 C)\,\mathrm{Cos}\left[\frac{3 d x}{2}\right]\mathrm{Sin}\left[\frac{3 c}{2}\right]}{768\,d}+$$

$$\frac{(1128 A+1145 C)\,\mathrm{Cos}\left[\frac{5 d x}{2}\right]\mathrm{Sin}\left[\frac{5 c}{2}\right]}{12\,288\,d}+$$

$$\frac{(20 A+29 C)\,\mathrm{Cos}\left[\frac{7 d x}{2}\right]\mathrm{Sin}\left[\frac{7 c}{2}\right]}{768\,d}+$$

$$\frac{(24 A+83 C)\,\mathrm{Cos}\left[\frac{9 d x}{2}\right]\mathrm{Sin}\left[\frac{9 c}{2}\right]}{6144\,d}+$$

$$\frac{C\,\mathrm{Cos}\left[\frac{11 d x}{2}\right]\mathrm{Sin}\left[\frac{11 c}{2}\right]}{256\,d}+\frac{C\,\mathrm{Cos}\left[\frac{13 d x}{2}\right]\mathrm{Sin}\left[\frac{13 c}{2}\right]}{1536\,d}-$$

$$\frac{(2120 A+1589 C)\,\mathrm{Cos}\left[\frac{c}{2}\right]\mathrm{Sin}\left[\frac{d x}{2}\right]}{12\,288\,d}+$$

$$\frac{11\,(20 A+17 C)\,\mathrm{Cos}\left[\frac{3 c}{2}\right]\mathrm{Sin}\left[\frac{3 d x}{2}\right]}{768\,d}+$$

$$\frac{(1128 A+1145 C)\,\mathrm{Cos}\left[\frac{5 c}{2}\right]\mathrm{Sin}\left[\frac{5 d x}{2}\right]}{12\,288\,d}+$$

$$\frac{(20 A+29 C)\,\mathrm{Cos}\left[\frac{7 c}{2}\right]\mathrm{Sin}\left[\frac{7 d x}{2}\right]}{768\,d}+\frac{(24 A+83 C)\,\mathrm{Cos}\left[\frac{9 c}{2}\right]\mathrm{Sin}\left[\frac{9 d x}{2}\right]}{6144\,d}+$$

$$\left.\frac{C\,\mathrm{Cos}\left[\frac{11 c}{2}\right]\mathrm{Sin}\left[\frac{11 d x}{2}\right]}{256\,d}+\frac{C\,\mathrm{Cos}\left[\frac{13 c}{2}\right]\mathrm{Sin}\left[\frac{13 d x}{2}\right]}{1536\,d}\right)$$

- **Problem 1231: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{11/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 289 leaves, 9 steps):

$$-\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+$$
$$\frac{2\,(257\,A+273\,C)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{315\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,(29\,A+21\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,(19\,A+21\,C)\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,A\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 263 leaves):

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}$$
$$\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1\,/\,d2\,i\,(A+C)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$1\,/\,(630\,d)\,(1279\,A+1071\,C-2\,(107\,A+63\,C)\,\text{Cos}[c+d\,x]+8\,(157\,A+168\,C)\,\text{Cos}[2\,(c+d\,x)]-58\,A\,\text{Cos}[3\,(c+d\,x)]-$$
$$\left.42\,C\,\text{Cos}[3\,(c+d\,x)]+257\,A\,\text{Cos}[4\,(c+d\,x)]+273\,C\,\text{Cos}[4\,(c+d\,x)])\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

- **Problem 1232: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 244 leaves, 8 steps):

$$\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}-\frac{2\,(43\,A+35\,C)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,(31\,A+35\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,A\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 214 leaves):

$$\frac{1}{\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(-1/d2\,i\,(A+C)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{4\,(73\,A+35\,C+24\,A\,\text{Cos}[c+d\,x]+(43\,A+35\,C)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]^3}{105\,d}\right)$$

## Problem 1233: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 201 leaves, 7 steps):

$$-\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+\frac{2\,(13\,A+15\,C)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{2\,A\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 209 leaves):

$$\left(2\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\left(15\,i\,(A+C)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+(19\,A+15\,C-2\,A\,\text{Cos}[c+d\,x]+(13\,A+15\,C)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(15\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}\right)$$

## Problem 1234: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 156 leaves, 6 steps):

$$\frac{\sqrt{2}\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}-\frac{2\,A\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 183 leaves):

$$-\frac{1}{3\, d\, \sqrt{a\, (1+\text{Cos}[c+d\, x])}}\, 2\, i\, \text{Cos}\left[\frac{1}{2}\, (c+d\, x)\right] \left(3\, (A+C)\, e^{-\frac{1}{2}\, i\, (c+d\, x)}\, \sqrt{\frac{e^{i\, (c+d\, x)}}{1+e^{2\, i\, (c+d\, x)}}}\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\, \left(\text{Log}\left[1+e^{i\, (c+d\, x)}\right]-\text{Log}\left[1-e^{i\, (c+d\, x)}+\sqrt{2}\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\right]\right)+ 4\, i\, A\, \text{Sec}[c+d\, x]^{3/2}\, \text{Sin}\left[\frac{1}{2}\, (c+d\, x)\right]^3\right)$$

## Problem 1235: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\left(A+C\, \text{Cos}[c+d\, x]^2\right)\, \text{Sec}[c+d\, x]^{3/2}}{\sqrt{a+a\, \text{Cos}[c+d\, x]}}\, dx$$

Optimal (type 3, 175 leaves, 7 steps):

$$\frac{2\, C\, \text{ArcSin}\left[\frac{\sqrt{a}\, \text{Sin}[c+d\, x]}{\sqrt{a+a\, \text{Cos}[c+d\, x]}}\right]\, \sqrt{\text{Cos}[c+d\, x]}\, \sqrt{\text{Sec}[c+d\, x]}}{\sqrt{a}\, d} - \frac{\sqrt{2}\, (A+C)\, \text{ArcTan}\left[\frac{\sqrt{a}\, \text{Sin}[c+d\, x]}{\sqrt{2}\, \sqrt{\text{Cos}[c+d\, x]}\, \sqrt{a+a\, \text{Cos}[c+d\, x]}}\right]\, \sqrt{\text{Cos}[c+d\, x]}\, \sqrt{\text{Sec}[c+d\, x]}}{\sqrt{a}\, d} + \frac{2\, A\, \sqrt{\text{Sec}[c+d\, x]}\, \text{Sin}[c+d\, x]}{d\, \sqrt{a+a\, \text{Cos}[c+d\, x]}}$$

Result (type 3, 290 leaves):

$$\frac{1}{d\, \sqrt{a\, (1+\text{Cos}[c+d\, x])}}\, \text{Cos}\left[\frac{1}{2}\, (c+d\, x)\right] \left(\sqrt{2}\, e^{-\frac{1}{2}\, i\, (c+d\, x)}\, \sqrt{\frac{e^{i\, (c+d\, x)}}{1+e^{2\, i\, (c+d\, x)}}}\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\, \left(C\, d\, x - i\, C\, \text{ArcSinh}\left[e^{i\, (c+d\, x)}\right] + i\, \sqrt{2}\, (A+C)\, \text{Log}\left[1+e^{i\, (c+d\, x)}\right] + i\, C\, \text{Log}\left[1+\sqrt{1+e^{2\, i\, (c+d\, x)}}\right] - i\, \sqrt{2}\, A\, \text{Log}\left[1-e^{i\, (c+d\, x)}+\sqrt{2}\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\right] - i\, \sqrt{2}\, C\, \text{Log}\left[1-e^{i\, (c+d\, x)}+\sqrt{2}\, \sqrt{1+e^{2\, i\, (c+d\, x)}}\right]\right) + 4\, A\, \sqrt{\text{Sec}[c+d\, x]}\, \text{Sin}\left[\frac{1}{2}\, (c+d\, x)\right]\right)$$

## Problem 1236: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\left(A+C\, \text{Cos}[c+d\, x]^2\right)\, \sqrt{\text{Sec}[c+d\, x]}}{\sqrt{a+a\, \text{Cos}[c+d\, x]}}\, dx$$

Optimal (type 3, 173 leaves, 7 steps):

$$-\frac{C \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{\sqrt{a} d}+\frac{\sqrt{2}(A+C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{\sqrt{a} d}+\frac{C \operatorname{Sin}[c+d x]}{d \sqrt{a+a \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 302 leaves) :

$$\frac{1}{2 d \sqrt{a(1+\operatorname{Cos}[c+d x])}} \, i \operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]\left(\sqrt{2}\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}}\left(i C d x+C \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]-2 \sqrt{2}(A+C) \operatorname{Log}\left[1+e^{i (c+d x)}\right]-C \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]+2 \sqrt{2} A \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]+2 \sqrt{2} C \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+2 i C \sqrt{\operatorname{Sec}[c+d x]}\left(\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]-\operatorname{Sin}\left[\frac{3}{2}(c+d x)\right]\right)\right)$$

- **Problem 1237: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+C \operatorname{Cos}[c+d x]^2}{\sqrt{a+a \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}} \, dx$$

Optimal (type 3, 223 leaves, 8 steps) :

$$\frac{(8 A+7 C) \operatorname{ArcSin}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{4 \sqrt{a} d}-\frac{\sqrt{2}(A+C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{\sqrt{a} d}+\frac{C \operatorname{Sin}[c+d x]}{2 d \sqrt{a+a \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^{3/2}}-\frac{C \operatorname{Sin}[c+d x]}{4 d \sqrt{a+a \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 3, 572 leaves) :

$$\frac{1}{16\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\,e^{-3\,i\,(c+d\,x)}\,\left(1+e^{i\,(c+d\,x)}\right)\,\Big(i\,C-2\,i\,C\,e^{i\,(c+d\,x)}+3\,i\,C\,e^{2\,i\,(c+d\,x)}-3\,i\,C\,e^{3\,i\,(c+d\,x)}+2\,i\,C\,e^{4\,i\,(c+d\,x)}-i\,C\,e^{5\,i\,(c+d\,x)}+8\,A\,d\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x+7\,C\,d\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x-i\,(8\,A+7\,C)\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+8\,i\,\sqrt{2}\,(A+C)\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+8\,i\,A\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+7\,i\,C\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,A\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-8\,i\,\sqrt{2}\,C\,e^{2\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\Big)\,\sqrt{\text{Sec}[c+d\,x]}$$

- **Problem 1238: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 266 leaves, 9 steps):

$$-\frac{(8\,A+9\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a}\,\,d}+\frac{\sqrt{2}\,\,(A+C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,\,d}+\frac{C\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}}-\frac{C\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}}+\frac{(8\,A+7\,C)\,\text{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 638 leaves):

$$-\frac{1}{96\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\,i\,e^{-4\,i\,(c+d\,x)}\,\left(1+e^{i\,(c+d\,x)}\right)\,\Big(-2\,C+3\,C\,e^{i\,(c+d\,x)}-24\,A\,e^{2\,i\,(c+d\,x)}-28\,C\,e^{2\,i\,(c+d\,x)}+24\,A\,e^{3\,i\,(c+d\,x)}+29\,C\,e^{3\,i\,(c+d\,x)}-24\,A\,e^{4\,i\,(c+d\,x)}-29\,C\,e^{4\,i\,(c+d\,x)}+24\,A\,e^{5\,i\,(c+d\,x)}+28\,C\,e^{5\,i\,(c+d\,x)}-3\,C\,e^{6\,i\,(c+d\,x)}+2\,C\,e^{7\,i\,(c+d\,x)}-24\,i\,A\,d\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x-27\,i\,C\,d\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x-3\,(8\,A+9\,C)\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+48\,\sqrt{2}\,(A+C)\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+24\,A\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+27\,C\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-48\,\sqrt{2}\,A\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-48\,\sqrt{2}\,C\,e^{3\,i\,(c+d\,x)}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\Big)\,\sqrt{\text{Sec}[c+d\,x]}$$

- **Problem 1239: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 315 leaves, 9 steps):

$$\frac{(19 A+11 C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{2 \sqrt{2} a^{3/2} d}-\frac{(1201 A+665 C) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{210 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}+\frac{(397 A+245 C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{210 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(67 A+35 C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{70 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(A+C) \operatorname{Sec}[c+d x]^{7/2} \operatorname{Sin}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(11 A+7 C) \operatorname{Sec}[c+d x]^{7/2} \operatorname{Sin}[c+d x]}{14 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 279 leaves):

$$\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{3/2}} \operatorname{Cos}\left[\frac{1}{2} (c+d x)\right]^3 \left(-1 / d i (19 A+11 C) e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)-\right.$$
$$1 / (840 d) (2339 A+1435 C+72 (71 A+35 C) \operatorname{Cos}[c+d x]+60 (67 A+35 C) \operatorname{Cos}[2 (c+d x)]+1608 A \operatorname{Cos}[3 (c+d x)]+$$
$$\left.840 C \operatorname{Cos}[3 (c+d x)]+1201 A \operatorname{Cos}[4 (c+d x)]+665 C \operatorname{Cos}[4 (c+d x)]) \operatorname{Sec}\left[\frac{1}{2} (c+d x)\right] \operatorname{Sec}[c+d x]^{7/2} \operatorname{Tan}\left[\frac{1}{2} (c+d x)\right]\right)$$

## Problem 1240: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^{7/2}}{(a+a \operatorname{Cos}[c+d x])^{3/2}} \, dx$$

Optimal (type 3, 268 leaves, 8 steps):

$$-\frac{(15 A+7 C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{2 \sqrt{2} a^{3/2} d}+\frac{(49 A+25 C) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{10 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(13 A+5 C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{10 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(A+C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{2 d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(9 A+5 C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{10 a d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 256 leaves):

$$\frac{1}{5\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(5\,i\,(15\,A+7\,C)\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\right.$$
$$\frac{1}{4}(88\,A+40\,C+(131\,A+75\,C)\,\text{Cos}[c+d\,x]+8\,(9\,A+5\,C)\,\text{Cos}[2\,(c+d\,x)]+49\,A\,\text{Cos}[3\,(c+d\,x)]+25\,C\,\text{Cos}[3\,(c+d\,x)])$$
$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}[c+d\,x]^{5/2}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 1241: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{5/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 221 leaves, 7 steps):

$$\frac{(11\,A+3\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\sqrt{\text{Cos}[c+d\,x]}\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\sqrt{\text{Sec}[c+d\,x]}}{2\sqrt{2}\,a^{3/2}\,d}-$$
$$\frac{(19\,A+3\,C)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{6\,a\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}-\frac{(A+C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}}+\frac{(7\,A+3\,C)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{6\,a\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}}$$

Result (type 3, 228 leaves):

$$\frac{1}{(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(-1/d\,i\,(11\,A+3\,C)\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)-\right.$$
$$\left.1/(6\,d)\,(11\,A+3\,C+24\,A\,\text{Cos}[c+d\,x]+(19\,A+3\,C)\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]\text{Sec}[c+d\,x]^{3/2}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

- **Problem 1242: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{3/2}}{(a+a\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 3, 172 leaves, 6 steps):

$$-\frac{(7A-C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\,\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{2\sqrt{2}\,a^{3/2}\,d}-$$
$$\frac{(A+C)\,\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{2\,d\,(a+a\,\text{Cos}[c+dx])^{3/2}}+\frac{(5A+C)\,\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+dx]}}$$

Result (type 3, 206 leaves):

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}}$$
$$\text{Cos}\left[\frac{1}{2}(c+dx)\right]^3\left(\mathrm{i}\,(7A-C)\,e^{-\frac{1}{2}\mathrm{i}\,(c+dx)}\sqrt{\frac{e^{\mathrm{i}\,(c+dx)}}{1+e^{2\,\mathrm{i}\,(c+dx)}}}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+dx)}}\left(\text{Log}\left[1+e^{\mathrm{i}\,(c+dx)}\right]-\text{Log}\left[1-e^{\mathrm{i}\,(c+dx)}+\sqrt{2}\,\sqrt{1+e^{2\,\mathrm{i}\,(c+dx)}}\right]\right)+\right.$$
$$\left.(4A+(5A+C)\,\text{Cos}[c+dx])\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]\sqrt{\text{Sec}[c+dx]}\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)$$

## Problem 1243: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\text{Cos}[c+dx]^2\right)\sqrt{\text{Sec}[c+dx]}}{(a+a\,\text{Cos}[c+dx])^{3/2}}\,dx$$

Optimal (type 3, 185 leaves, 7 steps):

$$\frac{2\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{a^{3/2}\,d}+$$
$$\frac{(3A-5C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\,\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{2\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Sin}[c+dx]}{2\,d\,(a+a\,\text{Cos}[c+dx])^{3/2}\,\sqrt{\text{Sec}[c+dx]}}$$

Result (type 3, 326 leaves):

$$\frac{1}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(\sqrt{2}\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(4\,C\,d\,x-4\,i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(3\,A-5\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+4\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+3\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-5\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+(A+C)\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{\text{Sec}[c+d\,x]}\left(\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]-\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)\right)$$

- **Problem 1244: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{3/2}\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 228 leaves, 8 steps):

$$-\frac{3\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{a^{3/2}\,d}+\frac{(A+9\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{2\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{(A+3\,C)\,\text{Sin}[c+d\,x]}{2\,a\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 329 leaves):

$$\frac{1}{2\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{3/2}}\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]^3\left(-i\,\sqrt{2}\,e^{-\frac{1}{2}i\,(c+d\,x)}\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\sqrt{1+e^{2\,i\,(c+d\,x)}}\left(-6\,i\,C\,d\,x-6\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\sqrt{2}\,(A+9\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+6\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-9\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+(A+3\,C+2\,C\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{\text{Sec}[c+d\,x]}\left(-\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]\right)\right)$$

- **Problem 1245: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 285 leaves, 9 steps):

$$\frac{(8A+19C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{4\,a^{3/2}\,d}-\frac{(5A+13C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{2}\,\sqrt{\text{Cos}[c+dx]}\,\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}{2\sqrt{2}\,a^{3/2}\,d}-\frac{(A+C)\,\text{Sin}[c+dx]}{2d\,(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sec}[c+dx]^{5/2}}+\frac{(A+2C)\,\text{Sin}[c+dx]}{2ad\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^{3/2}}-\frac{(2A+7C)\,\text{Sin}[c+dx]}{4ad\sqrt{a+a\,\text{Cos}[c+dx]}\,\sqrt{\text{Sec}[c+dx]}}$$

Result (type 3, 1004 leaves):

$$\frac{1}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}}\,i\,A\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\sqrt{1+e^{2i(c+dx)}}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\,\sqrt{1+e^{2i(c+dx)}}\right]\right)+$$
$$\left(7\,i\,C\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\sqrt{1+e^{2i(c+dx)}}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\left(\text{Log}\left[1+e^{i(c+dx)}\right]-\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\,\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/$$
$$\left(2d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\right)+\frac{1}{d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}}2\sqrt{2}\,A\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\sqrt{1+e^{2i(c+dx)}}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3$$
$$\left(dx-i\,\text{ArcSinh}\left[e^{i(c+dx)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i(c+dx)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2i(c+dx)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\,\sqrt{1+e^{2i(c+dx)}}\right]\right)+$$
$$\left(19\,C\,e^{-\frac{1}{2}i(c+dx)}\sqrt{\frac{e^{i(c+dx)}}{1+e^{2i(c+dx)}}}\,\sqrt{1+e^{2i(c+dx)}}\,\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\right.$$
$$\left.\left(dx-i\,\text{ArcSinh}\left[e^{i(c+dx)}\right]+i\sqrt{2}\,\text{Log}\left[1+e^{i(c+dx)}\right]+i\,\text{Log}\left[1+\sqrt{1+e^{2i(c+dx)}}\right]-i\sqrt{2}\,\text{Log}\left[1-e^{i(c+dx)}+\sqrt{2}\,\sqrt{1+e^{2i(c+dx)}}\right]\right)\right)\Big/$$
$$\left(2\sqrt{2}\,d\,(a\,(1+\text{Cos}[c+dx]))^{3/2}\right)+\frac{1}{(a\,(1+\text{Cos}[c+dx]))^{3/2}}\text{Cos}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\text{Sec}[c+dx]}$$
$$\left(\frac{(-4A+3C)\,\text{Cos}\left[\frac{dx}{2}\right]\text{Sin}\left[\frac{c}{2}\right]}{2d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]\left(A\,\text{Sin}\left[\frac{c}{2}\right]+C\,\text{Sin}\left[\frac{c}{2}\right]\right)}{d}-\frac{3C\,\text{Cos}\left[\frac{3dx}{2}\right]\text{Sin}\left[\frac{3c}{2}\right]}{d}+\frac{C\,\text{Cos}\left[\frac{5dx}{2}\right]\text{Sin}\left[\frac{5c}{2}\right]}{2d}+\right.$$
$$\left.\frac{(-4A+3C)\,\text{Cos}\left[\frac{c}{2}\right]\text{Sin}\left[\frac{dx}{2}\right]}{2d}+\frac{\text{Sec}\left[\frac{c}{2}\right]\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^2\left(A\,\text{Sin}\left[\frac{dx}{2}\right]+C\,\text{Sin}\left[\frac{dx}{2}\right]\right)}{d}-\frac{3C\,\text{Cos}\left[\frac{3c}{2}\right]\text{Sin}\left[\frac{3dx}{2}\right]}{d}+\frac{C\,\text{Cos}\left[\frac{5c}{2}\right]\text{Sin}\left[\frac{5dx}{2}\right]}{2d}\right)$$

## Problem 1246: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^{7/2}}{(a+a\,\text{Cos}[c+dx])^{5/2}}\,dx$$

Optimal (type 3, 315 leaves, 9 steps):

$$-\frac{(283 A+75 C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{16 \sqrt{2}\, a^{5/2} d}+\frac{(2671 A+735 C) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{240 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(787 A+195 C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{240 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(A+C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(21 A+5 C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{(157 A+45 C) \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{80 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 476 leaves):

$$\left(i (283 A+75 C) e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/ \left(4 d (a (1+\operatorname{Cos}[c+d x]))^{5/2}\right)+\frac{1}{(a (1+\operatorname{Cos}[c+d x]))^{5/2}}$$
$$\operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\operatorname{Sec}[c+d x]} \left(\frac{(2671 A+735 C) \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]}{30 d}+\frac{(2671 A+735 C) \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]}{30 d}+\right.$$
$$\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(-29 A \operatorname{Sin}\left[\frac{d x}{2}\right]-13 C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{4 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(-A \operatorname{Sin}\left[\frac{d x}{2}\right]-C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{2 d}-$$
$$\left.\frac{176 A \operatorname{Sec}[c+d x] \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{15 d}+\frac{16 A \operatorname{Sec}[c+d x]^2 \operatorname{Sin}\left[\frac{c}{2}+\frac{d x}{2}\right]}{5 d}-\frac{(29 A+13 C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{(A+C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 1247: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^{5/2}}{(a+a \operatorname{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 3, 266 leaves, 8 steps):

$$\frac{(163 A+19 C) \operatorname{ArcTan}\left[\frac{\sqrt{a} \operatorname{Sin}[c+d x]}{\sqrt{2} \sqrt{\operatorname{Cos}[c+d x]} \sqrt{a+a \operatorname{Cos}[c+d x]}}\right] \sqrt{\operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}}{16 \sqrt{2}\, a^{5/2} d}-\frac{(299 A+27 C) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{48 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}-\frac{(A+C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{4 d (a+a \operatorname{Cos}[c+d x])^{5/2}}-\frac{(17 A+C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{16 a d (a+a \operatorname{Cos}[c+d x])^{3/2}}+\frac{5 (19 A+3 C) \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{48 a^2 d \sqrt{a+a \operatorname{Cos}[c+d x]}}$$

Result (type 3, 261 leaves):

$$\frac{1}{4\,(a\,(1+\cos[c+d\,x]))^{5/2}}$$

$$\cos\left[\frac{1}{2}\,(c+d\,x)\right]^5\left(-1/d\,i\,(163\,A+19\,C)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\right]\right)-\right.$$

$$1/(24\,d)\,(878\,A+78\,C+(1537\,A+81\,C)\,\cos[c+d\,x]+2\,(503\,A+39\,C)\,\cos[2\,(c+d\,x)]+299\,A\,\cos[3\,(c+d\,x)]+27\,C\,\cos[3\,(c+d\,x)])$$

$$\left.\sec\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sec[c+d\,x]^{3/2}\,\tan\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

## Problem 1248: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\cos[c+d\,x]^2\right)\,\sec[c+d\,x]^{3/2}}{(a+a\,\cos[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 219 leaves, 7 steps):

$$-\frac{5\,(15\,A-C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\sin[c+d\,x]}{\sqrt{2}\,\sqrt{\cos[c+d\,x]}\,\sqrt{a+a\,\cos[c+d\,x]}}\right]\,\sqrt{\cos[c+d\,x]}\,\sqrt{\sec[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}-$$

$$\frac{(A+C)\,\sqrt{\sec[c+d\,x]}\,\sin[c+d\,x]}{4\,d\,(a+a\,\cos[c+d\,x])^{5/2}}-\frac{(13\,A-3\,C)\,\sqrt{\sec[c+d\,x]}\,\sin[c+d\,x]}{16\,a\,d\,(a+a\,\cos[c+d\,x])^{3/2}}+\frac{(49\,A+C)\,\sqrt{\sec[c+d\,x]}\,\sin[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\cos[c+d\,x]}}$$

Result (type 3, 230 leaves):

$$\left(\cos\left[\frac{1}{2}\,(c+d\,x)\right]^5\left(5\,i\,(15\,A-C)\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(\text{Log}\left[1+e^{i\,(c+d\,x)}\right]-\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\right]\right)+\right.\right.$$

$$\frac{1}{4}\,(113\,A+C+10\,(17\,A+C)\,\cos[c+d\,x]+(49\,A+C)\,\cos[2\,(c+d\,x)])$$

$$\left.\left.\sec\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sqrt{\sec[c+d\,x]}\,\tan\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/\left(4\,d\,(a\,(1+\cos[c+d\,x]))^{5/2}\right)$$

## Problem 1249: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\left(A+C\,\cos[c+d\,x]^2\right)\,\sqrt{\sec[c+d\,x]}}{(a+a\,\cos[c+d\,x])^{5/2}}\,dx$$

Optimal (type 3, 174 leaves, 6 steps):

$$\frac{(19 A+3 C)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{\mathrm{Sec}[c+d x]}}{16\sqrt{2}\,a^{5/2}\,d}-$$
$$\frac{(A+C)\,\mathrm{Sin}[c+d x]}{4 d\,(a+a\,\mathrm{Cos}[c+d x])^{5/2}\sqrt{\mathrm{Sec}[c+d x]}}-\frac{(9 A-7 C)\,\mathrm{Sin}[c+d x]}{16 a d\,(a+a\,\mathrm{Cos}[c+d x])^{3/2}\sqrt{\mathrm{Sec}[c+d x]}}$$

Result (type 3, 233 leaves) :

$$-\left(i\,\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]^5\right.$$
$$\left((19 A+3 C)\,e^{-\frac{1}{2} i (c+d x)}\sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}}\,\sqrt{1+e^{2 i (c+d x)}}\left(\mathrm{Log}\left[1+e^{i (c+d x)}\right]-\mathrm{Log}\left[1-e^{i (c+d x)}+\sqrt{2}\,\sqrt{1+e^{2 i (c+d x)}}\right]\right)+\frac{1}{4}\,i\,(13 A-3 C+\right.$$
$$\left.\left.(9 A-7 C)\,\mathrm{Cos}[c+d x])\,\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^4\sqrt{\mathrm{Sec}[c+d x]}\left(\mathrm{Sin}\left[\frac{1}{2}(c+d x)\right]-\mathrm{Sin}\left[\frac{3}{2}(c+d x)\right]\right)\right)\right)\Big/\left(4 d\,(a\,(1+\mathrm{Cos}[c+d x]))^{5/2}\right)$$

- **Problem 1250: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d x]^2}{(a+a\,\mathrm{Cos}[c+d x])^{5/2}\sqrt{\mathrm{Sec}[c+d x]}}\,dx$$

Optimal (type 3, 232 leaves, 8 steps) :

$$\frac{2 C\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{\mathrm{Sec}[c+d x]}}{a^{5/2}\,d}+\frac{(5 A-43 C)\,\mathrm{ArcTan}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d x]}{\sqrt{2}\,\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{a+a\,\mathrm{Cos}[c+d x]}}\right]\sqrt{\mathrm{Cos}[c+d x]}\,\sqrt{\mathrm{Sec}[c+d x]}}{16\sqrt{2}\,a^{5/2}\,d}-$$
$$\frac{(A+C)\,\mathrm{Sin}[c+d x]}{4 d\,(a+a\,\mathrm{Cos}[c+d x])^{5/2}\,\mathrm{Sec}[c+d x]^{3/2}}+\frac{(5 A-11 C)\,\mathrm{Sin}[c+d x]}{16 a d\,(a+a\,\mathrm{Cos}[c+d x])^{3/2}\sqrt{\mathrm{Sec}[c+d x]}}$$

Result (type 3, 345 leaves) :

$$\frac{1}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5\left(\sqrt{2}\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(32\,C\,d\,x-32\,i\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-i\,\sqrt{2}\,(5\,A-43\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+32\,i\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+5\,i\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-43\,i\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{1}{2}\,(5\,A-11\,C+(A-15\,C)\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4\,\sqrt{\text{Sec}[c+d\,x]}\,\left(-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 1251: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 277 leaves, 9 steps):

$$-\frac{5\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{a^{5/2}\,d}+\frac{(3\,A+115\,C)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{16\,\sqrt{2}\,a^{5/2}\,d}-\frac{(A+C)\,\text{Sin}[c+d\,x]}{4\,d\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{5/2}}+\frac{(A-15\,C)\,\text{Sin}[c+d\,x]}{16\,a\,d\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}+\frac{(3\,A+35\,C)\,\text{Sin}[c+d\,x]}{16\,a^2\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 352 leaves):

$$\frac{1}{8\,d\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}}\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^5\left(-i\,\sqrt{2}\,e^{-\frac{1}{2}\,i\,(c+d\,x)}\,\sqrt{\frac{e^{i\,(c+d\,x)}}{1+e^{2\,i\,(c+d\,x)}}}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\left(-80\,i\,C\,d\,x-80\,C\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]+\sqrt{2}\,(3\,A+115\,C)\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+80\,C\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-3\,\sqrt{2}\,A\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-115\,\sqrt{2}\,C\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\right)+\frac{1}{2}\,(3\,A+43\,C+(7\,A+55\,C)\,\text{Cos}[c+d\,x]+8\,C\,\text{Cos}[2\,(c+d\,x)])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^4\,\sqrt{\text{Sec}[c+d\,x]}\,\left(-\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)\right)$$

- **Problem 1252: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{5/2}}\,dx$$

Optimal (type 3, 334 leaves, 10 steps):

$$\frac{(8 A + 39 C) \text{ArcSin}\left[\frac{\sqrt{a} \text{ Sin}[c+d x]}{\sqrt{a+a \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c + d x]} \sqrt{\text{Sec}[c + d x]}}{4 a^{5/2} d} -$$

$$\frac{(43 A + 219 C) \text{ArcTan}\left[\frac{\sqrt{a} \text{ Sin}[c+d x]}{\sqrt{2} \sqrt{\text{Cos}[c+d x]} \sqrt{a+a \text{Cos}[c+d x]}}\right] \sqrt{\text{Cos}[c + d x]} \sqrt{\text{Sec}[c + d x]}}{16 \sqrt{2} a^{5/2} d} - \frac{(A + C) \text{Sin}[c + d x]}{4 d (a + a \text{Cos}[c + d x])^{5/2} \text{Sec}[c + d x]^{7/2}} -$$

$$\frac{(3 A + 19 C) \text{Sin}[c + d x]}{16 a d (a + a \text{Cos}[c + d x])^{3/2} \text{Sec}[c + d x]^{5/2}} + \frac{(7 A + 31 C) \text{Sin}[c + d x]}{16 a^2 d \sqrt{a + a \text{Cos}[c + d x]} \text{Sec}[c + d x]^{3/2}} - \frac{(11 A + 63 C) \text{Sin}[c + d x]}{16 a^2 d \sqrt{a + a \text{Cos}[c + d x]} \sqrt{\text{Sec}[c + d x]}}$$

Result (type 3, 1076 leaves) :

$$\left(11\, i\, A\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$

$$\left(4 d \left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}\right)+$$

$$\left(63\, i\, C\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \left(\operatorname{Log}\left[1+e^{i (c+d x)}\right]-\operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$

$$\left(4 d \left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}\right)+\frac{1}{d \left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}} 4 \sqrt{2}\, A\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5$$

$$\left(d x - i \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]+i \sqrt{2} \operatorname{Log}\left[1+e^{i (c+d x)}\right]+i \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-i \sqrt{2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)+$$

$$\left(39\, C\, e^{-\frac{1}{2} i (c+d x)} \sqrt{\frac{e^{i (c+d x)}}{1+e^{2 i (c+d x)}}} \sqrt{1+e^{2 i (c+d x)}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\right.$$

$$\left.\left(d x - i \operatorname{ArcSinh}\left[e^{i (c+d x)}\right]+i \sqrt{2} \operatorname{Log}\left[1+e^{i (c+d x)}\right]+i \operatorname{Log}\left[1+\sqrt{1+e^{2 i (c+d x)}}\right]-i \sqrt{2} \operatorname{Log}\left[1-e^{i (c+d x)}+\sqrt{2} \sqrt{1+e^{2 i (c+d x)}}\right]\right)\right) \Big/$$

$$\left(\sqrt{2}\, d \left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}\right)+\frac{1}{\left(a \left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}} \operatorname{Cos}\left[\frac{c}{2}+\frac{d x}{2}\right]^5 \sqrt{\operatorname{Sec}[c+d x]}$$

$$\left(-\frac{3 (5 A+3 C) \operatorname{Cos}\left[\frac{d x}{2}\right] \operatorname{Sin}\left[\frac{c}{2}\right]}{2 d}-\frac{10 C \operatorname{Cos}\left[\frac{3 d x}{2}\right] \operatorname{Sin}\left[\frac{3 c}{2}\right]}{d}+\frac{C \operatorname{Cos}\left[\frac{5 d x}{2}\right] \operatorname{Sin}\left[\frac{5 c}{2}\right]}{d}-\frac{3 (5 A+3 C) \operatorname{Cos}\left[\frac{c}{2}\right] \operatorname{Sin}\left[\frac{d x}{2}\right]}{2 d}+\right.$$

$$\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^4 \left(-A \operatorname{Sin}\left[\frac{d x}{2}\right]-C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{2 d}+\frac{\operatorname{Sec}\left[\frac{c}{2}\right] \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^2 \left(19 A \operatorname{Sin}\left[\frac{d x}{2}\right]+35 C \operatorname{Sin}\left[\frac{d x}{2}\right]\right)}{4 d}-$$

$$\left.\frac{10 C \operatorname{Cos}\left[\frac{3 c}{2}\right] \operatorname{Sin}\left[\frac{3 d x}{2}\right]}{d}+\frac{C \operatorname{Cos}\left[\frac{5 c}{2}\right] \operatorname{Sin}\left[\frac{5 d x}{2}\right]}{d}+\frac{(19 A+35 C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right] \operatorname{Tan}\left[\frac{c}{2}\right]}{4 d}-\frac{(A+C) \operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^3 \operatorname{Tan}\left[\frac{c}{2}\right]}{2 d}\right)$$

- **Problem 1313: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+a \operatorname{Cos}[c+d x]} \left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^{5/2}\, dx$$

Optimal (type 3, 140 leaves, 5 steps) :

$$\frac{2\sqrt{a}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+$$
$$\frac{2\,a\,(A+3\,B)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+\frac{2\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 424 leaves) :

$$\frac{1}{d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{2}{3}\,(2\,A+3\,B)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{2}{3}\,A\,\text{Sec}[c+d\,x]\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)-$$
$$\frac{1}{d}8\,\left(-3-2\,\sqrt{2}\right)\,C\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\,\sqrt{2}+\left(10-7\,\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}$$
$$\sqrt{\frac{-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}\,\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\,\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\,\text{Sec}[c+d\,x]^{3/2}\,\sqrt{3-2\,\sqrt{2}-\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1314: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 141 leaves, 5 steps) :

$$\frac{\sqrt{a}\,(2\,B+C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}-$$
$$\frac{a\,(2\,A-C)\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,A\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 4, 422 leaves) :

$$\frac{\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}\;\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\mathrm{Sec}[c+d\,x]}\;\left(\frac{1}{2}\,(4\,A-C)\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{2}\,C\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)}{d}-$$

$$\frac{1}{d}4\left(-3-2\sqrt{2}\right)(2\,B+C)\,\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}$$

$$\sqrt{\frac{-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\sqrt{a\,(1+\mathrm{Cos}[c+d\,x])}$$

$$\left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\mathrm{EllipticPi}\left[-3+2\sqrt{2},-\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\mathrm{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\;\mathrm{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1315: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\sqrt{\mathrm{Sec}[c+d\,x]}\;dx$$

Optimal (type 3, 151 leaves, 5 steps):

$$\frac{\sqrt{a}\;(8\,A+4\,B+3\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\;\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\;\sqrt{\mathrm{Sec}[c+d\,x]}}{4\,d}+$$

$$\frac{a\,(4\,B+C)\,\mathrm{Sin}[c+d\,x]}{4\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{C\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{2\,d\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 4, 441 leaves):

$$\frac{1}{d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\ \left(-\frac{1}{8}\,(4\,B+C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{4}\,(2\,B+C)\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+\frac{1}{8}\,C\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)+$$

$$\frac{1}{d}\left(2+\frac{3}{\sqrt{2}}\right)(8\,A+4\,B+3\,C)\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4$$

$$\sqrt{\frac{7-5\,\sqrt{2}+\left(10-7\,\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}\ \left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$

$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\,\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]\right)$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\ \text{Sec}[c+d\,x]^{3/2}\sqrt{3-2\,\sqrt{2}-\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1316: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 3, 199 leaves, 6 steps):

$$\frac{\sqrt{a}\ (8\,A+6\,B+5\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}{8\,d}+$$

$$\frac{a\,(6\,B+C)\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{3/2}}+\frac{C\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{3\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{a\,(8\,A+6\,B+5\,C)\,\text{Sin}[c+d\,x]}{8\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 472 leaves):

$$\frac{1}{d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(-\frac{1}{48}\,(24\,A+6\,B+11\,C)\ \text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{12}\,(6\,A+3\,B+4\,C)\ \text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+\frac{1}{16}\,(2\,B+C)\ \text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]+\frac{1}{24}\,C\,\text{Sin}\left[\frac{7}{2}\,(c+d\,x)\right]\right)+$$

$$\frac{1}{d}\left(1+\frac{3}{2\sqrt{2}}\right)(8\,A+6\,B+5\,C)\ \text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}$$

$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$

$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]\right)$$

$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\ \text{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1317: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 247 leaves, 7 steps):

$$\frac{\sqrt{a}\ (48\,A+40\,B+35\,C)\ \text{ArcSin}\left[\frac{\sqrt{a}\ \text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}{64\,d}+\frac{a\,(8\,B+C)\ \text{Sin}[c+d\,x]}{24\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{5/2}}+$$

$$\frac{C\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \text{Sin}[c+d\,x]}{4\,d\,\text{Sec}[c+d\,x]^{5/2}}+\frac{a\,(48\,A+40\,B+35\,C)\ \text{Sin}[c+d\,x]}{96\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \text{Sec}[c+d\,x]^{3/2}}+\frac{a\,(48\,A+40\,B+35\,C)\ \text{Sin}[c+d\,x]}{64\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 496 leaves):

$$\frac{1}{d}\sqrt{a\,(1+\text{Cos}[c+d\,x])}\ \text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\text{Sec}[c+d\,x]}\ \left(-\frac{1}{384}\,(48\,A+88\,B+41\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{48}\,(12\,A+16\,B+11\,C)\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+\right.$$
$$\left.\frac{1}{128}\,(16\,A+8\,B+15\,C)\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]+\frac{1}{48}\,(2\,B+C)\,\text{Sin}\left[\frac{7}{2}\,(c+d\,x)\right]+\frac{1}{64}\,C\,\text{Sin}\left[\frac{9}{2}\,(c+d\,x)\right]\right)+\frac{1}{\left(-64+48\,\sqrt{2}\right)\,d}$$
$$(48\,A+40\,B+35\,C)\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\,\sqrt{2}+\left(10-7\,\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}\ \left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\sqrt{a\,(1+\text{Cos}[c+d\,x])}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\,\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\ \text{Sec}[c+d\,x]^{3/2}\sqrt{3-2\,\sqrt{2}-\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1321: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 3, 192 leaves, 6 steps):

$$\frac{2\,a^{3/2}\,C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{d}+\frac{2\,a^2\,(12\,A+20\,B+15\,C)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{15\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}+$$
$$\frac{2\,a\,(3\,A+5\,B)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 4, 470 leaves):

$$\frac{1}{d}(a\,(1+\operatorname{Cos}[c+d\,x]))^{3/2}\operatorname{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\operatorname{Sec}[c+d\,x]}$$
$$\left(\frac{1}{15}(18\,A+25\,B+15\,C)\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\frac{1}{5}A\operatorname{Sec}[c+d\,x]^2\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\frac{1}{15}\operatorname{Sec}[c+d\,x]\left(9\,A\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]+5\,B\operatorname{Sin}\left[\frac{1}{2}(c+d\,x)\right]\right)\right)-$$
$$\frac{1}{d}4\left(-3-2\sqrt{2}\right)C\operatorname{Cos}\left[\frac{1}{4}(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]}{1+\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]}}$$
$$\sqrt{\frac{-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]}{1+\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]}}\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)(a\,(1+\operatorname{Cos}[c+d\,x]))^{3/2}$$
$$\left(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\operatorname{Tan}\left[\frac{1}{4}(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\operatorname{EllipticPi}\left[-3+2\sqrt{2},-\operatorname{ArcSin}\left[\frac{\operatorname{Tan}\left[\frac{1}{4}(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\operatorname{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)\operatorname{Sec}\left[\frac{1}{4}(c+d\,x)\right]^2}\operatorname{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\operatorname{Tan}\left[\frac{1}{4}(c+d\,x)\right]^2}$$

- **Problem 1322: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\operatorname{Cos}[c+d\,x])^{3/2}\left(A+B\operatorname{Cos}[c+d\,x]+C\operatorname{Cos}[c+d\,x]^2\right)\operatorname{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 3, 191 leaves, 6 steps):

$$\frac{a^{3/2}(2\,B+3\,C)\operatorname{ArcSin}\left[\frac{\sqrt{a}\operatorname{Sin}[c+d\,x]}{\sqrt{a+a\operatorname{Cos}[c+d\,x]}}\right]\sqrt{\operatorname{Cos}[c+d\,x]}\sqrt{\operatorname{Sec}[c+d\,x]}}{d}-\frac{a^2(8\,A+6\,B-3\,C)\operatorname{Sin}[c+d\,x]}{3\,d\sqrt{a+a\operatorname{Cos}[c+d\,x]}\sqrt{\operatorname{Sec}[c+d\,x]}}+$$
$$\frac{2\,a\,(A+B)\sqrt{a+a\operatorname{Cos}[c+d\,x]}\sqrt{\operatorname{Sec}[c+d\,x]}\operatorname{Sin}[c+d\,x]}{d}+\frac{2\,A\,(a+a\operatorname{Cos}[c+d\,x])^{3/2}\operatorname{Sec}[c+d\,x]^{3/2}\operatorname{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 452 leaves):

$$\frac{1}{d}(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\mathrm{Sec}[c+d\,x]}$$
$$\left(\frac{1}{12}\,(20\,A+12\,B-3\,C)\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{3}\,A\,\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{4}\,C\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)-$$
$$\frac{1}{d}2\left(-3-2\sqrt{2}\right)(2\,B+3\,C)\,\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}$$
$$\sqrt{\frac{-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)(a\,(1+\mathrm{Cos}[c+d\,x]))^{3/2}$$
$$\left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]+2\,\mathrm{EllipticPi}\left[-3+2\sqrt{2},\,-\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]\right)$$
$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\mathrm{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\;\mathrm{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1323: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 3, 201 leaves, 6 steps) :

$$\frac{a^{3/2}\,(8\,A+12\,B+7\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{4\,d}-\frac{a^2\,(8\,A-4\,B-5\,C)\,\mathrm{Sin}[c+d\,x]}{4\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}-$$
$$\frac{a\,(4\,A-C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{2\,A\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{d}$$

Result (type 4, 454 leaves) :

$$\frac{1}{d}(a\,(1+\text{Cos}[c+d\,x]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(\frac{1}{16}\,(16\,A-4\,B-5\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{8}\,(2\,B+3\,C)\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]+\frac{1}{16}\,C\,\text{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]\right)+\frac{1}{d}\left(1+\frac{3}{2\sqrt{2}}\right)(8\,A+12\,B+7\,C)$$
$$\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}\,\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)(a\,(1+\text{Cos}[c+d\,x]))^{3/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\,\text{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1324: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 3, 201 leaves, 6 steps):

$$\frac{a^{3/2}\,(24\,A+14\,B+11\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{8\,d}+$$
$$\frac{a^2\,(24\,A+30\,B+19\,C)\,\text{Sin}[c+d\,x]}{24\,d\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,(2\,B+C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\sqrt{\text{Sec}[c+d\,x]}}+\frac{C\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 479 leaves):

$$\frac{1}{d}(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\text{Sec}[c+dx]}$$
$$\left(-\frac{1}{96}(24A+30B+17C)\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]+\frac{1}{24}(6A+9B+7C)\,\text{Sin}\left[\frac{3}{2}(c+dx)\right]+\frac{1}{32}(2B+3C)\,\text{Sin}\left[\frac{5}{2}(c+dx)\right]+\frac{1}{48}C\,\text{Sin}\left[\frac{7}{2}(c+dx)\right]\right)+$$
$$\frac{1}{8d}\left(4+3\sqrt{2}\right)(24A+14B+11C)\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]}{1+\text{Cos}\left[\frac{1}{2}(c+dx)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)(a(1+\text{Cos}[c+dx]))^{3/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+dx)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+dx)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)\text{Sec}\left[\frac{1}{4}(c+dx)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)\text{Sec}\left[\frac{1}{4}(c+dx)\right]^2}\;\text{Sec}[c+dx]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}(c+dx)\right]^2}$$

- **Problem 1325: Result unnecessarily involves higher level functions.**

$$\int\frac{(a+a\,\text{Cos}[c+dx])^{3/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\sqrt{\text{Sec}[c+dx]}}\,dx$$

Optimal (type 3, 253 leaves, 7 steps):

$$\frac{a^{3/2}(112A+88B+75C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\sqrt{\text{Sec}[c+dx]}}{64d}+\frac{a^2(48A+56B+39C)\,\text{Sin}[c+dx]}{96d\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^{3/2}}+$$
$$\frac{a(8B+3C)\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{24d\,\text{Sec}[c+dx]^{3/2}}+\frac{C(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sin}[c+dx]}{4d\,\text{Sec}[c+dx]^{3/2}}+\frac{a^2(112A+88B+75C)\,\text{Sin}[c+dx]}{64d\sqrt{a+a\,\text{Cos}[c+dx]}\sqrt{\text{Sec}[c+dx]}}$$

Result (type 4, 503 leaves):

$$\frac{1}{d}\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\mathrm{Sec}[c+d\,x]}\left(-\frac{1}{768}\left(240\,A+136\,B+129\,C\right)\mathrm{Sin}\left[\frac{1}{2}\left(c+d\,x\right)\right]+\frac{1}{96}\left(36\,A+28\,B+27\,C\right)\mathrm{Sin}\left[\frac{3}{2}\left(c+d\,x\right)\right]+\frac{1}{256}\left(16\,A+24\,B+23\,C\right)\mathrm{Sin}\left[\frac{5}{2}\left(c+d\,x\right)\right]+\frac{1}{96}\left(2\,B+3\,C\right)\mathrm{Sin}\left[\frac{7}{2}\left(c+d\,x\right)\right]+\frac{1}{128}\,C\,\mathrm{Sin}\left[\frac{9}{2}\left(c+d\,x\right)\right]\right)+$$

$$\frac{1}{64\,d}\left(4+3\sqrt{2}\right)\left(112\,A+88\,B+75\,C\right)\mathrm{Cos}\left[\frac{1}{4}\left(c+d\,x\right)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\left(c+d\,x\right)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}\left(c+d\,x\right)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\left(c+d\,x\right)\right]\right)\left(a\left(1+\mathrm{Cos}[c+d\,x]\right)\right)^{3/2}$$
$$\left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\left(c+d\,x\right)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\mathrm{EllipticPi}\left[-3+2\sqrt{2},-\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\left(c+d\,x\right)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^3\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\left(c+d\,x\right)\right]\right)\mathrm{Sec}\left[\frac{1}{4}\left(c+d\,x\right)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\left(c+d\,x\right)\right]\right)\mathrm{Sec}\left[\frac{1}{4}\left(c+d\,x\right)\right]^2}\;\mathrm{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\mathrm{Tan}\left[\frac{1}{4}\left(c+d\,x\right)\right]^2}$$

- **Problem 1326: Result unnecessarily involves higher level functions.**

$$\int\frac{\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 303 leaves, 8 steps):

$$\frac{a^{3/2}\left(176\,A+150\,B+133\,C\right)\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{128\,d}+$$
$$\frac{a^2\left(80\,A+90\,B+67\,C\right)\mathrm{Sin}[c+d\,x]}{240\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a\left(10\,B+3\,C\right)\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{40\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+$$
$$\frac{C\left(a+a\,\mathrm{Cos}[c+d\,x]\right)^{3/2}\mathrm{Sin}[c+d\,x]}{5\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a^2\left(176\,A+150\,B+133\,C\right)\mathrm{Sin}[c+d\,x]}{192\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{a^2\left(176\,A+150\,B+133\,C\right)\mathrm{Sin}[c+d\,x]}{128\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 4, 527 leaves):

$$\frac{1}{d}(a(1+\text{Cos}[c+dx]))^{3/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\text{Sec}[c+dx]}$$
$$\left(-\frac{(1360A+1290B+1019C)\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{7680}+\frac{1}{960}(280A+270B+239C)\,\text{Sin}\left[\frac{3}{2}(c+dx)\right]+\frac{1}{512}(48A+46B+49C)\,\text{Sin}\left[\frac{5}{2}(c+dx)\right]+\right.$$
$$\left.\frac{1}{480}(10A+15B+17C)\,\text{Sin}\left[\frac{7}{2}(c+dx)\right]+\frac{1}{256}(2B+3C)\,\text{Sin}\left[\frac{9}{2}(c+dx)\right]+\frac{1}{320}C\,\text{Sin}\left[\frac{11}{2}(c+dx)\right]\right)+$$
$$\frac{1}{64d}\left(2+\frac{3}{\sqrt{2}}\right)(176A+150B+133C)\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]}{1+\text{Cos}\left[\frac{1}{2}(c+dx)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)(a(1+\text{Cos}[c+dx]))^{3/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+dx)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+dx)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^3\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)\text{Sec}\left[\frac{1}{4}(c+dx)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)\text{Sec}\left[\frac{1}{4}(c+dx)\right]^2}\;\text{Sec}[c+dx]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}(c+dx)\right]^2}$$

- **Problem 1330: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\,\text{Cos}[c+dx])^{5/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)\text{Sec}[c+dx]^{9/2}\,dx$$

Optimal (type 3, 242 leaves, 7 steps):

$$\frac{2a^{5/2}C\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\sqrt{\text{Sec}[c+dx]}}{d}+$$
$$\frac{2a^3(160A+224B+245C)\sqrt{\text{Sec}[c+dx]}\,\text{Sin}[c+dx]}{105d\sqrt{a+a\,\text{Cos}[c+dx]}}+\frac{2a^2(40A+56B+35C)\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^{3/2}\,\text{Sin}[c+dx]}{105d}+$$
$$\frac{2a(5A+7B)(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sec}[c+dx]^{5/2}\,\text{Sin}[c+dx]}{35d}+\frac{2A(a+a\,\text{Cos}[c+dx])^{5/2}\,\text{Sec}[c+dx]^{7/2}\,\text{Sin}[c+dx]}{7d}$$

Result (type 4, 522 leaves):

$$\frac{1}{d}\left(a\left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\operatorname{Sec}[c+d x]}$$

$$\left(\frac{1}{210}(230 A+301 B+280 C)\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+\frac{1}{14}A\operatorname{Sec}[c+d x]^3\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+\frac{1}{70}\operatorname{Sec}[c+d x]^2\right.$$

$$\left.\left(20 A\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+7 B\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)+\frac{1}{210}\operatorname{Sec}[c+d x]\left(115 A\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+98 B\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]+35 C\operatorname{Sin}\left[\frac{1}{2}(c+d x)\right]\right)\right)-$$

$$\frac{1}{d}2\left(-3-2\sqrt{2}\right)C\operatorname{Cos}\left[\frac{1}{4}(c+d x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]}{1+\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]}}\sqrt{\frac{-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]}{1+\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]}}$$

$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]\right)\left(a\left(1+\operatorname{Cos}[c+d x]\right)\right)^{5/2}$$

$$\left(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\operatorname{Tan}\left[\frac{1}{4}(c+d x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\operatorname{EllipticPi}\left[-3+2\sqrt{2},-\operatorname{ArcSin}\left[\frac{\operatorname{Tan}\left[\frac{1}{4}(c+d x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$

$$\operatorname{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\operatorname{Cos}\left[\frac{1}{2}(c+d x)\right]\right)\operatorname{Sec}\left[\frac{1}{4}(c+d x)\right]^2}\operatorname{Sec}[c+d x]^{3/2}\sqrt{3-2\sqrt{2}-\operatorname{Tan}\left[\frac{1}{4}(c+d x)\right]^2}$$

- **Problem 1331: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int(a+a\operatorname{Cos}[c+d x])^{5/2}\left(A+B\operatorname{Cos}[c+d x]+C\operatorname{Cos}[c+d x]^2\right)\operatorname{Sec}[c+d x]^{7/2}\,dx$$

Optimal (type 3, 243 leaves, 7 steps):

$$\frac{a^{5/2}(2 B+5 C)\operatorname{ArcSin}\left[\frac{\sqrt{a}\operatorname{Sin}[c+d x]}{\sqrt{a+a\operatorname{Cos}[c+d x]}}\right]\sqrt{\operatorname{Cos}[c+d x]}\sqrt{\operatorname{Sec}[c+d x]}}{d}-$$

$$\frac{a^3(64 A+70 B+15 C)\operatorname{Sin}[c+d x]}{15 d\sqrt{a+a\operatorname{Cos}[c+d x]}\sqrt{\operatorname{Sec}[c+d x]}}+\frac{2 a^2(8 A+10 B+5 C)\sqrt{a+a\operatorname{Cos}[c+d x]}\sqrt{\operatorname{Sec}[c+d x]}\operatorname{Sin}[c+d x]}{5 d}+$$

$$\frac{2 a(A+B)(a+a\operatorname{Cos}[c+d x])^{3/2}\operatorname{Sec}[c+d x]^{3/2}\operatorname{Sin}[c+d x]}{3 d}+\frac{2 A(a+a\operatorname{Cos}[c+d x])^{5/2}\operatorname{Sec}[c+d x]^{5/2}\operatorname{Sin}[c+d x]}{5 d}$$

Result (type 4, 488 leaves):

$$\frac{1}{d}(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{1}{120}\,(172\,A+160\,B+45\,C)\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$
$$\left.\frac{1}{10}\,A\,\text{Sec}[c+d\,x]^2\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{30}\,\text{Sec}[c+d\,x]\,\left(14\,A\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+5\,B\,\text{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]\right)+\frac{1}{8}\,C\,\text{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]\right)+$$
$$\frac{1}{d}\left(2+\frac{3}{\sqrt{2}}\right)\,(2\,B+5\,C)\,\text{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\,\sqrt{\frac{7-5\,\sqrt{2}+\left(10-7\,\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,(a\,(1+\text{Cos}[c+d\,x]))^{5/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\,\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\,\sqrt{2}}}\right],\,17-12\,\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\,\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\,\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\,\text{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\,\text{Sec}[c+d\,x]^{3/2}\,\sqrt{3-2\,\sqrt{2}-\text{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1332: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 3, 253 leaves, 7 steps):

$$\frac{a^{5/2}\,(8\,A+20\,B+19\,C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{4\,d}-$$
$$\frac{a^3\,(56\,A+12\,B-27\,C)\,\text{Sin}[c+d\,x]}{12\,d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{a^2\,(8\,A+4\,B-C)\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$
$$\frac{2\,a\,(5\,A+3\,B)\,(a+a\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+a\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 476 leaves):

$$\frac{1}{d}(a(1+\text{Cos}[c+d x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\text{Sec}[c+d x]}$$
$$\left(\frac{1}{96}(128 A+36 B-27 C)\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+\frac{1}{6}A\,\text{Sec}[c+d x]\,\text{Sin}\left[\frac{1}{2}(c+d x)\right]+\frac{1}{16}(2 B+5 C)\,\text{Sin}\left[\frac{3}{2}(c+d x)\right]+\frac{1}{32}C\,\text{Sin}\left[\frac{5}{2}(c+d x)\right]\right)+$$
$$\frac{1}{8 d}\left(4+3\sqrt{2}\right)(8 A+20 B+19 C)\,\text{Cos}\left[\frac{1}{4}(c+d x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d x)\right]}{1+\text{Cos}\left[\frac{1}{2}(c+d x)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d x)\right]\right)(a(1+\text{Cos}[c+d x]))^{5/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+d x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+d x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d x}{2}\right]^5\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d x)\right]\right)\text{Sec}\left[\frac{1}{4}(c+d x)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d x)\right]\right)\text{Sec}\left[\frac{1}{4}(c+d x)\right]^2}\;\text{Sec}[c+d x]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}(c+d x)\right]^2}$$

- **Problem 1333: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\text{Cos}[c+d x])^{5/2}\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)\text{Sec}[c+d x]^{3/2}\,dx$$

Optimal (type 3, 251 leaves, 7 steps):

$$\frac{a^{5/2}(40 A+38 B+25 C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d x]}{\sqrt{a+a\,\text{Cos}[c+d x]}}\right]\sqrt{\text{Cos}[c+d x]}\sqrt{\text{Sec}[c+d x]}}{8 d}-$$
$$\frac{a^3(24 A-54 B-49 C)\,\text{Sin}[c+d x]}{24 d\sqrt{a+a\,\text{Cos}[c+d x]}\sqrt{\text{Sec}[c+d x]}}-\frac{a^2(8 A-2 B-3 C)\sqrt{a+a\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{4 d\sqrt{\text{Sec}[c+d x]}}-$$
$$\frac{a(6 A-C)(a+a\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{3 d\sqrt{\text{Sec}[c+d x]}}+\frac{2 A(a+a\,\text{Cos}[c+d x])^{5/2}\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{d}$$

Result (type 4, 479 leaves):

$$\frac{1}{d}(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}\,\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(\frac{1}{192}(72\,A-54\,B-47\,C)\,\mathrm{Sin}\left[\frac{1}{2}(c+d\,x)\right]+\frac{1}{48}(6\,A+15\,B+16\,C)\,\mathrm{Sin}\left[\frac{3}{2}(c+d\,x)\right]+\frac{1}{64}(2\,B+5\,C)\,\mathrm{Sin}\left[\frac{5}{2}(c+d\,x)\right]+\frac{1}{96}C\,\mathrm{Sin}\left[\frac{7}{2}(c+d\,x)\right]\right)+$$

$$\frac{1}{8\,d}\left(2+\frac{3}{\sqrt{2}}\right)(40\,A+38\,B+25\,C)\,\mathrm{Cos}\left[\frac{1}{4}(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]}}$$

$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)(a\,(1+\mathrm{Cos}[c+d\,x]))^{5/2}$$

$$\left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]+2\,\mathrm{EllipticPi}\left[-3+2\sqrt{2},\,-\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)\mathrm{Sec}\left[\frac{1}{4}(c+d\,x)\right]^2}$$

$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)\mathrm{Sec}\left[\frac{1}{4}(c+d\,x)\right]^2}\;\mathrm{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\mathrm{Tan}\left[\frac{1}{4}(c+d\,x)\right]^2}$$

- **Problem 1334: Result unnecessarily involves higher level functions.**

$$\int(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\sqrt{\mathrm{Sec}[c+d\,x]}\,dx$$

Optimal (type 3, 253 leaves, 7 steps) :

$$\frac{a^{5/2}(304\,A+200\,B+163\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{64\,d}+\frac{a^3(432\,A+392\,B+299\,C)\,\mathrm{Sin}[c+d\,x]}{192\,d\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}+$$

$$\frac{a^2(16\,A+24\,B+17\,C)\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{32\,d\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{a\,(8\,B+5\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{24\,d\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{C\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{4\,d\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 4, 503 leaves) :

$$\frac{1}{d}(a(1+\text{Cos}[c+dx]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\text{Sec}[c+dx]}\left(-\frac{(432A+376B+265C)\,\text{Sin}\left[\frac{1}{2}(c+dx)\right]}{1536}+\frac{1}{192}(60A+64B+55C)\,\text{Sin}\left[\frac{3}{2}(c+dx)\right]+\frac{1}{512}(16A+40B+47C)\,\text{Sin}\left[\frac{5}{2}(c+dx)\right]+\frac{1}{192}(2B+5C)\,\text{Sin}\left[\frac{7}{2}(c+dx)\right]+\frac{1}{256}C\,\text{Sin}\left[\frac{9}{2}(c+dx)\right]\right)+$$

$$\frac{1}{64d}\left(2+\frac{3}{\sqrt{2}}\right)(304A+200B+163C)\,\text{Cos}\left[\frac{1}{4}(c+dx)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]}{1+\text{Cos}\left[\frac{1}{2}(c+dx)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)(a(1+\text{Cos}[c+dx]))^{5/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+dx)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},\,-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+dx)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{dx}{2}\right]^5\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)\text{Sec}\left[\frac{1}{4}(c+dx)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+dx)\right]\right)\text{Sec}\left[\frac{1}{4}(c+dx)\right]^2}\ \text{Sec}[c+dx]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}(c+dx)\right]^2}$$

- **Problem 1335: Result unnecessarily involves higher level functions.**

$$\int\frac{(a+a\,\text{Cos}[c+dx])^{5/2}\left(A+B\,\text{Cos}[c+dx]+C\,\text{Cos}[c+dx]^2\right)}{\sqrt{\text{Sec}[c+dx]}}\,dx$$

Optimal (type 3, 301 leaves, 8 steps):

$$\frac{a^{5/2}(400A+326B+283C)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+dx]}{\sqrt{a+a\,\text{Cos}[c+dx]}}\right]\sqrt{\text{Cos}[c+dx]}\sqrt{\text{Sec}[c+dx]}}{128d}+$$
$$\frac{a^3(1040A+950B+787C)\,\text{Sin}[c+dx]}{960d\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sec}[c+dx]^{3/2}}+\frac{a^2(80A+110B+79C)\sqrt{a+a\,\text{Cos}[c+dx]}\,\text{Sin}[c+dx]}{240d\,\text{Sec}[c+dx]^{3/2}}+$$
$$\frac{a(2B+C)(a+a\,\text{Cos}[c+dx])^{3/2}\,\text{Sin}[c+dx]}{8d\,\text{Sec}[c+dx]^{3/2}}+\frac{C(a+a\,\text{Cos}[c+dx])^{5/2}\,\text{Sin}[c+dx]}{5d\,\text{Sec}[c+dx]^{3/2}}+\frac{a^3(400A+326B+283C)\,\text{Sin}[c+dx]}{128d\sqrt{a+a\,\text{Cos}[c+dx]}\sqrt{\text{Sec}[c+dx]}}$$

Result (type 4, 527 leaves):

$$\frac{1}{d}\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{5/2}\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(-\frac{(3760\,A+2650\,B+2309\,C)\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]}{15\,360}+\frac{(640\,A+550\,B+509\,C)\,\mathrm{Sin}\left[\frac{3}{2}\,(c+d\,x)\right]}{1920}+\frac{(80\,A+94\,B+95\,C)\,\mathrm{Sin}\left[\frac{5}{2}\,(c+d\,x)\right]}{1024}+\right.$$

$$\left.\frac{1}{960}\,(10\,A+25\,B+32\,C)\,\mathrm{Sin}\left[\frac{7}{2}\,(c+d\,x)\right]+\frac{1}{512}\,(2\,B+5\,C)\,\mathrm{Sin}\left[\frac{9}{2}\,(c+d\,x)\right]+\frac{1}{640}\,C\,\mathrm{Sin}\left[\frac{11}{2}\,(c+d\,x)\right]\right)+$$

$$\frac{1}{256\,d}\left(4+3\sqrt{2}\right)(400\,A+326\,B+283\,C)\,\mathrm{Cos}\left[\frac{1}{4}\,(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]}}$$

$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\left(a\,(1+\mathrm{Cos}[c+d\,x])\right)^{5/2}$$

$$\left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]+2\,\mathrm{EllipticPi}\left[-3+2\sqrt{2},\,-\mathrm{ArcSin}\left[\frac{\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],\,17-12\sqrt{2}\right]\right)$$

$$\mathrm{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\mathrm{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\mathrm{Sec}\left[\frac{1}{4}\,(c+d\,x)\right]^2}\;\mathrm{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\mathrm{Tan}\left[\frac{1}{4}\,(c+d\,x)\right]^2}$$

- **Problem 1336: Result unnecessarily involves higher level functions.**

$$\int\frac{(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 3, 353 leaves, 9 steps):

$$\frac{a^{5/2}\,(1304\,A+1132\,B+1015\,C)\,\mathrm{ArcSin}\left[\frac{\sqrt{a}\,\mathrm{Sin}[c+d\,x]}{\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}}\right]\sqrt{\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}{512\,d}+\frac{a^3\,(680\,A+628\,B+545\,C)\,\mathrm{Sin}[c+d\,x]}{960\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}}+$$

$$\frac{a^2\,(120\,A+156\,B+115\,C)\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{480\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a\,(12\,B+5\,C)\,(a+a\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{60\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+$$

$$\frac{C\,(a+a\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sin}[c+d\,x]}{6\,d\,\mathrm{Sec}[c+d\,x]^{5/2}}+\frac{a^3\,(1304\,A+1132\,B+1015\,C)\,\mathrm{Sin}[c+d\,x]}{768\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}}+\frac{a^3\,(1304\,A+1132\,B+1015\,C)\,\mathrm{Sin}[c+d\,x]}{512\,d\,\sqrt{a+a\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 4, 551 leaves):

$$\frac{1}{d}(a\,(1+\text{Cos}[c+d\,x]))^{5/2}\,\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\text{Sec}[c+d\,x]}$$
$$\left(-\frac{(10\,600\,A+9236\,B+7945\,C)\,\text{Sin}\left[\frac{1}{2}(c+d\,x)\right]}{61\,440}+\frac{(1100\,A+1018\,B+935\,C)\,\text{Sin}\left[\frac{3}{2}(c+d\,x)\right]}{3840}+\frac{(1128\,A+1140\,B+1145\,C)\,\text{Sin}\left[\frac{5}{2}(c+d\,x)\right]}{12\,288}+\right.$$
$$\left.\frac{(100\,A+128\,B+145\,C)\,\text{Sin}\left[\frac{7}{2}(c+d\,x)\right]}{3840}+\frac{(24\,A+60\,B+83\,C)\,\text{Sin}\left[\frac{9}{2}(c+d\,x)\right]}{6144}+\frac{(2\,B+5\,C)\,\text{Sin}\left[\frac{11}{2}(c+d\,x)\right]}{1280}+\frac{C\,\text{Sin}\left[\frac{13}{2}(c+d\,x)\right]}{1536}\right)+$$
$$\frac{1}{512\,d}\left(2+\frac{3}{\sqrt{2}}\right)(1304\,A+1132\,B+1015\,C)\,\text{Cos}\left[\frac{1}{4}(c+d\,x)\right]^4\sqrt{\frac{7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]}{1+\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]}}$$
$$\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)(a\,(1+\text{Cos}[c+d\,x]))^{5/2}$$
$$\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{1}{4}(c+d\,x)\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\text{Sec}\left[\frac{c}{2}+\frac{d\,x}{2}\right]^5\sqrt{\left(-1+\sqrt{2}-\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}(c+d\,x)\right]^2}$$
$$\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{1}{2}(c+d\,x)\right]\right)\text{Sec}\left[\frac{1}{4}(c+d\,x)\right]^2}\;\text{Sec}[c+d\,x]^{3/2}\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{1}{4}(c+d\,x)\right]^2}$$

- **Problem 1345: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int\frac{\left(a\,A+(A\,b+a\,B)\,\text{Cos}[c+d\,x]+b\,B\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 3, 192 leaves, 7 steps):

$$\frac{(2\,A\,b+2\,a\,B-b\,B)\,\text{ArcSin}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+$$
$$\frac{\sqrt{2}\,(a-b)\,(A-B)\,\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Sin}[c+d\,x]}{\sqrt{2}\,\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{a+a\,\text{Cos}[c+d\,x]}}\right]\sqrt{\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a}\,d}+\frac{b\,B\,\text{Sin}[c+d\,x]}{d\,\sqrt{a+a\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 3, 807 leaves):

$$\frac{1}{4\,d\,\sqrt{a\,(1+\text{Cos}[c+d\,x])}}\;e^{-2\,i\,(c+d\,x)}\left(1+e^{i\,(c+d\,x)}\right)\Big(i\,b\,B-i\,b\,B\,e^{i\,(c+d\,x)}+i\,b\,B\,e^{2\,i\,(c+d\,x)}-i\,b\,B\,e^{3\,i\,(c+d\,x)}+2\,A\,b\,d\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x+2\,a\,B\,d\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x-$$
$$b\,B\,d\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,x-i\,(2\,A\,b+2\,a\,B-b\,B)\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{ArcSinh}\left[e^{i\,(c+d\,x)}\right]-$$
$$2\,i\,\sqrt{2}\,(a-b)\,(A-B)\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+e^{i\,(c+d\,x)}\right]+2\,i\,A\,b\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+$$
$$2\,i\,a\,B\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-i\,b\,B\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1+\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+$$
$$2\,i\,\sqrt{2}\,a\,A\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,i\,\sqrt{2}\,A\,b\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}$$
$$\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]-2\,i\,\sqrt{2}\,a\,B\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]+$$
$$2\,i\,\sqrt{2}\,b\,B\,e^{i\,(c+d\,x)}\sqrt{1+e^{2\,i\,(c+d\,x)}}\,\text{Log}\left[1-e^{i\,(c+d\,x)}+\sqrt{2}\,\sqrt{1+e^{2\,i\,(c+d\,x)}}\right]\Big)\sqrt{\text{Sec}[c+d\,x]}$$

- **Problem 1391: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}}{a+b\,\text{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 266 leaves, 9 steps):

$$-\frac{2\left(5\,A\,b^2+a^2\,(3\,A+5\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,a^3\,d}-$$
$$\frac{2\,A\,b\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,a^2\,d}-\frac{2\,b\,\left(A\,b^2+a^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{a^3\,(a+b)\,d}+$$
$$\frac{2\left(5\,A\,b^2+a^2\,(3\,A+5\,C)\right)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{5\,a^3\,d}-\frac{2\,A\,b\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,d}+\frac{2\,A\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}$$

Result (type 4, 648 leaves):

$$-\frac{1}{30 a^3 d}\left(-\left(2 \left(18 a^3 A+40 a A b^2+30 a^3 C\right) \text{Cos}[c+d x]^2 \,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]\right.\right.$$
$$\left.(b+a \,\text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2}\, \text{Sin}[c+d x]\right) \Big/ \left(b (a+b \,\text{Cos}[c+d x]) \left(1-\text{Cos}[c+d x]^2\right)\right)+$$
$$\left(2 \left(19 a^2 A b+45 A b^3+45 a^2 b C\right) \text{Cos}[c+d x]^2 \left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]+\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]\right)\right.$$
$$\left.(b+a \,\text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2}\, \text{Sin}[c+d x]\right) \Big/ \left(a (a+b \,\text{Cos}[c+d x]) \left(1-\text{Cos}[c+d x]^2\right)\right)+$$
$$\left(\left(9 a^2 A b+15 A b^3+15 a^2 b C\right) \text{Cos}[2 (c+d x)] (b+a \,\text{Sec}[c+d x]) \left(-4 a b+4 a b \,\text{Sec}[c+d x]^2-\right.\right.$$
$$4 a b \,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+2 (2 a-b) b \,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right]$$
$$\sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+4 a^2 \,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}-$$
$$\left.\left.2 b^2 \,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right],-1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}\right) \text{Sin}[c+d x]\right) \Big/$$
$$\left.\left(a b^2 (a+b \,\text{Cos}[c+d x]) \left(1-\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]} \left(2-\text{Sec}[c+d x]^2\right)\right)\right)+$$
$$\frac{\sqrt{\text{Sec}[c+d x]} \left(\frac{2 \left(3 a^2 A+5 A b^2+5 a^2 C\right) \text{Sin}[c+d x]}{5 a^3}-\frac{2 A b \,\text{Tan}[c+d x]}{3 a^2}+\frac{2 A \,\text{Sec}[c+d x] \,\text{Tan}[c+d x]}{5 a}\right)}{d}$$

- **Problem 1395: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+C \,\text{Cos}[c+d x]^2}{(a+b \,\text{Cos}[c+d x]) \sqrt{\text{Sec}[c+d x]}}\, dx$$

Optimal (type 4, 190 leaves, 7 steps) :

$$-\frac{2 a C \sqrt{\text{Cos}[c+d x]}\, \text{EllipticE}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{b^2 d}+\frac{2 \left(3 a^2 C+b^2 (3 A+C)\right) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{3 b^3 d}-$$
$$\frac{2 a \left(A b^2+a^2 C\right) \sqrt{\text{Cos}[c+d x]}\, \text{EllipticPi}\left[\frac{2 b}{a+b},\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{b^3 (a+b) d}+\frac{2 C \,\text{Sin}[c+d x]}{3 b d \sqrt{\text{Sec}[c+d x]}}$$

Result (type 4, 539 leaves) :

$$\frac{1}{6\,b\,d}\left(-\left(2\,(6\,A\,b+2\,b\,C)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\Big/\left(b\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\right)-\left(2\,C\,\text{Cos}[c+d\,x]^2\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]+\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\right)(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\Big/\left((a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\right)-\left(3\,C\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\left(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\right)\text{Sin}[c+d\,x]\right)\Big/\left(b^2\,(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Cos}[c+d\,x]^2)\,\sqrt{\text{Sec}[c+d\,x]}\,(2-\text{Sec}[c+d\,x]^2)\right)\right)+\frac{C\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{3\,b\,d}$$

- **Problem 1396: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 241 leaves, 8 steps) :

$$\frac{2\left(5\,a^2\,C+b^2\,(5\,A+3\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,b^3\,d}-\frac{2\,a\left(3\,A\,b^2+\left(3\,a^2+b^2\right)C\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,b^4\,d}+\frac{2\,a^2\left(A\,b^2+a^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{b^4\,(a+b)\,d}+\frac{2\,C\,\text{Sin}[c+d\,x]}{5\,b\,d\,\text{Sec}[c+d\,x]^{3/2}}-\frac{2\,a\,C\,\text{Sin}[c+d\,x]}{3\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 603 leaves) :

$$\frac{1}{30 b^2 d}\left(-\left(16 a C \operatorname{Cos}[c+d x]^2 \operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] (b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2} \operatorname{Sin}[c+d x]\right)\Big/\right.$$
$$\left((a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Cos}[c+d x]^2\right)\right)+$$
$$\left(2 \left(15 A b^2+5 a^2 C+9 b^2 C\right) \operatorname{Cos}[c+d x]^2 \left(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right]+\operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right]\right)\right.$$
$$\left.(b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2} \operatorname{Sin}[c+d x]\right)\Big/\left(a (a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Cos}[c+d x]^2\right)\right)+$$
$$\left(\left(15 A b^2+15 a^2 C+9 b^2 C\right) \operatorname{Cos}[2 (c+d x)] (b+a \operatorname{Sec}[c+d x]) \left(-4 a b+4 a b \operatorname{Sec}[c+d x]^2-4 a b \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right]\right.\right.$$
$$\sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+2 (2 a-b) b \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+$$
$$4 a^2 \operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}-$$
$$\left.\left.2 b^2 \operatorname{EllipticPi}\left[-\frac{a}{b}, -\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right], -1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}\right) \operatorname{Sin}[c+d x]\right)\Big/$$
$$\left.\left(a b^2 (a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Cos}[c+d x]^2\right) \sqrt{\operatorname{Sec}[c+d x]} \left(2-\operatorname{Sec}[c+d x]^2\right)\right)\right)+$$
$$\frac{\sqrt{\operatorname{Sec}[c+d x]} \left(\frac{C \operatorname{Sin}[c+d x]}{10 b}-\frac{a C \operatorname{Sin}[2 (c+d x)]}{3 b^2}+\frac{C \operatorname{Sin}[3 (c+d x)]}{10 b}\right)}{d}$$

## Problem 1397: Result more than twice size of optimal antiderivative.

$$\int \frac{A+C \operatorname{Cos}[c+d x]^2}{(a+b \operatorname{Cos}[c+d x]) \operatorname{Sec}[c+d x]^{5/2}} \, dx$$

Optimal (type 4, 299 leaves, 9 steps):

$$-\frac{2 a \left(5 A b^2+5 a^2 C+3 b^2 C\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{5 b^4 d}+$$
$$\frac{2 \left(21 a^4 C+7 a^2 b^2 (3 A+C)+b^4 (7 A+5 C)\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{21 b^5 d}-$$
$$\frac{2 a^3 \left(A b^2+a^2 C\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{b^5 (a+b) d}+$$
$$\frac{2 C \operatorname{Sin}[c+d x]}{7 b d \operatorname{Sec}[c+d x]^{5/2}}-\frac{2 a C \operatorname{Sin}[c+d x]}{5 b^2 d \operatorname{Sec}[c+d x]^{3/2}}+\frac{2 \left(7 a^2 C+b^2 (7 A+5 C)\right) \operatorname{Sin}[c+d x]}{21 b^3 d \sqrt{\operatorname{Sec}[c+d x]}}$$

Result (type 4, 663 leaves):

$$-\frac{1}{210\, b^3\, d}\Bigg(-\Big(2\left(-70\, A\, b^3+56\, a^2\, b\, C-50\, b^3\, C\right) \mathrm{Cos}[c+d\, x]^2\, \mathrm{EllipticPi}\left[-\frac{a}{b},\, -\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right]$$

$$(b+a\, \mathrm{Sec}[c+d\, x])\, \sqrt{1-\mathrm{Sec}[c+d\, x]^2}\, \mathrm{Sin}[c+d\, x]\Big)\Big/ \left(b\, (a+b\, \mathrm{Cos}[c+d\, x])\, \left(1-\mathrm{Cos}[c+d\, x]^2\right)\right)+$$

$$\Big(2\left(35\, a\, A\, b^2+35\, a^3\, C+13\, a\, b^2\, C\right) \mathrm{Cos}[c+d\, x]^2\, \left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right]+\mathrm{EllipticPi}\left[-\frac{a}{b},\, -\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right]\right)$$

$$(b+a\, \mathrm{Sec}[c+d\, x])\, \sqrt{1-\mathrm{Sec}[c+d\, x]^2}\, \mathrm{Sin}[c+d\, x]\Big)\Big/ \left(a\, (a+b\, \mathrm{Cos}[c+d\, x])\, \left(1-\mathrm{Cos}[c+d\, x]^2\right)\right)+$$

$$\Big(\left(105\, a\, A\, b^2+105\, a^3\, C+63\, a\, b^2\, C\right) \mathrm{Cos}[2\, (c+d\, x)]\, (b+a\, \mathrm{Sec}[c+d\, x])\, \Big(-4\, a\, b+4\, a\, b\, \mathrm{Sec}[c+d\, x]^2-$$

$$4\, a\, b\, \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right] \sqrt{\mathrm{Sec}[c+d\, x]}\, \sqrt{1-\mathrm{Sec}[c+d\, x]^2}+2\, (2\, a-b)\, b\, \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right]$$

$$\sqrt{\mathrm{Sec}[c+d\, x]}\, \sqrt{1-\mathrm{Sec}[c+d\, x]^2}+4\, a^2\, \mathrm{EllipticPi}\left[-\frac{a}{b},\, -\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right] \sqrt{\mathrm{Sec}[c+d\, x]}\, \sqrt{1-\mathrm{Sec}[c+d\, x]^2}-$$

$$2\, b^2\, \mathrm{EllipticPi}\left[-\frac{a}{b},\, -\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\, x]}\right],\, -1\right] \sqrt{\mathrm{Sec}[c+d\, x]}\, \sqrt{1-\mathrm{Sec}[c+d\, x]^2}\Big)\, \mathrm{Sin}[c+d\, x]\Big)\Big/$$

$$\left(a\, b^2\, (a+b\, \mathrm{Cos}[c+d\, x])\, \left(1-\mathrm{Cos}[c+d\, x]^2\right) \sqrt{\mathrm{Sec}[c+d\, x]}\, \left(2-\mathrm{Sec}[c+d\, x]^2\right)\right)\Bigg)+$$

$$\frac{\sqrt{\mathrm{Sec}[c+d\, x]}\, \left(-\frac{a\, C\, \mathrm{Sin}[c+d\, x]}{10\, b^2}+\frac{\left(14\, A\, b^2+14\, a^2\, C+13\, b^2\, C\right) \mathrm{Sin}[2\, (c+d\, x)]}{42\, b^3}-\frac{a\, C\, \mathrm{Sin}[3\, (c+d\, x)]}{10\, b^2}+\frac{C\, \mathrm{Sin}[4\, (c+d\, x)]}{28\, b}\right)}{d}$$

## Problem 1399: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+C\, \mathrm{Cos}[c+d\, x]^2\right) \mathrm{Sec}[c+d\, x]^{3/2}}{(a+b\, \mathrm{Cos}[c+d\, x])^2}\, dx$$

Optimal (type 4, 330 leaves, 8 steps):

$$\frac{\left(3\, A\, b^2-a^2\, (2\, A-C)\right) \sqrt{\mathrm{Cos}[c+d\, x]}\, \mathrm{EllipticE}\left[\frac{1}{2}\, (c+d\, x),\, 2\right] \sqrt{\mathrm{Sec}[c+d\, x]}}{a^2\, \left(a^2-b^2\right) d}+$$

$$\frac{\left(A\, b^2+a^2\, C\right) \sqrt{\mathrm{Cos}[c+d\, x]}\, \mathrm{EllipticF}\left[\frac{1}{2}\, (c+d\, x),\, 2\right] \sqrt{\mathrm{Sec}[c+d\, x]}}{a\, b\, \left(a^2-b^2\right) d}+$$

$$\frac{\left(3\, A\, b^4-a^4\, C-a^2\, b^2\, (5\, A+C)\right) \sqrt{\mathrm{Cos}[c+d\, x]}\, \mathrm{EllipticPi}\left[\frac{2\, b}{a+b},\, \frac{1}{2}\, (c+d\, x),\, 2\right] \sqrt{\mathrm{Sec}[c+d\, x]}}{a^2\, (a-b)\, b\, (a+b)^2\, d}-$$

$$\frac{\left(3\, A\, b^2-a^2\, (2\, A-C)\right) \sqrt{\mathrm{Sec}[c+d\, x]}\, \mathrm{Sin}[c+d\, x]}{a^2\, \left(a^2-b^2\right) d}+\frac{\left(A\, b^2+a^2\, C\right) \sqrt{\mathrm{Sec}[c+d\, x]}\, \mathrm{Sin}[c+d\, x]}{a\, \left(a^2-b^2\right) d\, (a+b\, \mathrm{Cos}[c+d\, x])}$$

Result (type 4, 682 leaves):

$$
\begin{aligned}
&-\frac{1}{4 a^2 (a-b)(a+b) d}\Bigg(-\Big(2\left(4 a^3 A-8 a A b^2-4 a^3 C\right) \text{Cos}[c+d x]^2 \,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\,(b+a\,\text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2}\\
&\qquad \text{Sin}[c+d x]\Big)\Big/\Big(b\,(a+b\,\text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\Big)+\\
&\quad \Big(2\left(10 a^2 A b-9 A b^3+a^2 b C\right) \text{Cos}[c+d x]^2\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\Big)\\
&\qquad (b+a\,\text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2}\ \text{Sin}[c+d x]\Big)\Big/\Big(a\,(a+b\,\text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right)\Big)+\\
&\quad \Big(\left(2 a^2 A b-3 A b^3-a^2 b C\right) \text{Cos}[2 (c+d x)]\,(b+a\,\text{Sec}[c+d x])\Big(-4 a b+4 a b\,\text{Sec}[c+d x]^2-4 a b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big]\\
&\qquad \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+2 (2 a-b) b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+\\
&\qquad 4 a^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}-\\
&\qquad 2 b^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d x]}\Big],-1\Big] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}\Big)\,\text{Sin}[c+d x]\Big)\Big/\\
&\quad \Big(a b^2 (a+b\,\text{Cos}[c+d x])\left(1-\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]}\left(2-\text{Sec}[c+d x]^2\right)\Big)\Bigg)+\\
&\frac{\sqrt{\text{Sec}[c+d x]}\left(\frac{\left(2 a^2 A-3 A b^2-a^2 C\right) \text{Sin}[c+d x]}{a^2 \left(a^2-b^2\right)}+\frac{A b^2\,\text{Sin}[c+d x]+a^2 C\,\text{Sin}[c+d x]}{a \left(a^2-b^2\right) (a+b\,\text{Cos}[c+d x])}\right)}{d}
\end{aligned}
$$

## Problem 1400: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+C\,\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^2}\,dx$$

Optimal (type 4, 274 leaves, 7 steps):

$$
\begin{aligned}
&-\frac{\left(A b^2+a^2 C\right) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{a b \left(a^2-b^2\right) d}-\\
&\frac{\left(A b^2-a^2 C+2 b^2 C\right) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{b^2 \left(a^2-b^2\right) d}-\\
&\frac{\left(A b^4+a^4 C-3 a^2 b^2 (A+C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticPi}\left[\frac{2 b}{a+b},\frac{1}{2} (c+d x),2\right] \sqrt{\text{Sec}[c+d x]}}{a (a-b) b^2 (a+b)^2 d}+\frac{\left(A b^2+a^2 C\right) \text{Sin}[c+d x]}{a \left(a^2-b^2\right) d\,(a+b\,\text{Cos}[c+d x]) \sqrt{\text{Sec}[c+d x]}}
\end{aligned}
$$

Result (type 4, 657 leaves):

$$\frac{1}{4\,a\,(-a+b)\,(a+b)\,d}\left(-\left(2\,(4\,a\,A\,b+4\,a\,b\,C)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\bigg/\left(b\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+\left(2\,\left(-4\,a^2\,A+3\,A\,b^2-a^2\,C\right)\,\text{Cos}[c+d\,x]^2\,\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]+\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\right)\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\right)\bigg/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+\left(\left(A\,b^2+a^2\,C\right)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\left(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],-1\right]\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\right)\,\text{Sin}[c+d\,x]\right)\bigg/\left(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\right)+\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{\left(A\,b^2+a^2\,C\right)\,\text{Sin}[c+d\,x]}{a\,b\,\left(a^2-b^2\right)}+\frac{A\,b^2\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]}{b\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

- **Problem 1401: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^2\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 277 leaves, 7 steps):

$$\frac{\left(A\,b^2+3\,a^2\,C-2\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b^2\,\left(a^2-b^2\right)\,d}+\frac{a\,\left(A\,b^2-3\,a^2\,C+4\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{b^3\,\left(a^2-b^2\right)\,d}-\frac{\left(A\,b^4-3\,a^4\,C+a^2\,b^2\,(A+5\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]\,\sqrt{\text{Sec}[c+d\,x]}}{(a-b)\,b^3\,(a+b)^2\,d}-\frac{\left(A\,b^2+a^2\,C\right)\,\text{Sin}[c+d\,x]}{b\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 663 leaves):

$$\frac{1}{4\,(a-b)\,b\,(a+b)\,d}\Bigg(\Big(-\Big(2\,(4\,a\,A\,b+4\,a\,b\,C)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/$$
$$\Big(b\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\Big)+$$
$$\Big(2\,\big(-A\,b^2+a^2\,C-2\,b^2\,C\big)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\Big)$$
$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Big)\Big/\Big(a\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\Big)+$$
$$\Big(\big(A\,b^2+3\,a^2\,C-2\,b^2\,C\big)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$
$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Big)\Big/$$
$$\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\,\sqrt{\text{Sec}[c+d\,x]}\,\big(2-\text{Sec}[c+d\,x]^2\big)\Big)\Bigg)+$$
$$\frac{\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{(A\,b^2+a^2\,C)\,\text{Sin}[c+d\,x]}{b^2\,(-a^2+b^2)}+\frac{-a\,A\,b^2\,\text{Sin}[c+d\,x]-a^3\,C\,\text{Sin}[c+d\,x]}{b^2\,(-a^2+b^2)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

## Problem 1406: Result more than twice size of optimal antiderivative.

$$\int\frac{\big(A+C\,\text{Cos}[c+d\,x]^2\big)\,\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^3}\,dx$$

Optimal (type 4, 405 leaves, 8 steps):

$$\frac{\big(3\,A\,b^4-a^4\,C-a^2\,b^2\,(9\,A+5\,C)\big)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\big[\frac{1}{2}\,(c+d\,x),2\big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,a^2\,b\,\big(a^2-b^2\big)^2\,d}+$$
$$\frac{\big(A\,b^4+a^4\,C-7\,a^2\,b^2\,(A+C)\big)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\big[\frac{1}{2}\,(c+d\,x),2\big]\,\sqrt{\text{Sec}[c+d\,x]}}{4\,a\,b^2\,\big(a^2-b^2\big)^2\,d}+\frac{1}{4\,a^2\,(a-b)^2\,b^2\,(a+b)^3\,d}$$
$$\Big(3\,A\,b^6-3\,a^2\,b^4\,(2\,A-C)-a^6\,C+5\,a^4\,b^2\,(3\,A+2\,C)\Big)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\Big[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\Big]\,\sqrt{\text{Sec}[c+d\,x]}+$$
$$\frac{\big(A\,b^2+a^2\,C\big)\,\text{Sin}[c+d\,x]}{2\,a\,\big(a^2-b^2\big)\,d\,(a+b\,\text{Cos}[c+d\,x])^2\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{\big(3\,A\,b^4-a^4\,C-a^2\,b^2\,(9\,A+5\,C)\big)\,\text{Sin}[c+d\,x]}{4\,a^2\,\big(a^2-b^2\big)^2\,d\,(a+b\,\text{Cos}[c+d\,x])\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 816 leaves):

$$\frac{1}{16\,a^2\,(a-b)^2\,(a+b)^2\,d}$$
$$\Bigg(-\Bigg(2\,\left(-32\,a^3\,A\,b+8\,a\,A\,b^3-24\,a^3\,b\,C\right)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}$$
$$\text{Sin}[c+d\,x]\Bigg)\Big/\left(b\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+\Bigg(2\,\left(16\,a^4\,A-19\,a^2\,A\,b^2+9\,A\,b^4+5\,a^4\,C+a^2\,b^2\,C\right)$$
$$\text{Cos}[c+d\,x]^2\,\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]+\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\right)$$
$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Big/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$
$$\Bigg(\left(-9\,a^2\,A\,b^2+3\,A\,b^4-a^4\,C-5\,a^2\,b^2\,C\right)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Bigg(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-$$
$$4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Bigg)\,\text{Sin}[c+d\,x]\Bigg)\Big/$$
$$\left(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\Bigg)+\frac{1}{d}$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{\left(9\,a^2\,A\,b^2-3\,A\,b^4+a^4\,C+5\,a^2\,b^2\,C\right)\,\text{Sin}[c+d\,x]}{4\,a^2\,b\,\left(a^2-b^2\right)^2}+\frac{A\,b^2\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]}{2\,b\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])^2}+\right.$$
$$\left.\frac{-7\,a^2\,A\,b^2\,\text{Sin}[c+d\,x]+A\,b^4\,\text{Sin}[c+d\,x]+a^4\,C\,\text{Sin}[c+d\,x]-7\,a^2\,b^2\,C\,\text{Sin}[c+d\,x]}{4\,a\,b\,\left(a^2-b^2\right)^2\,(a+b\,\text{Cos}[c+d\,x])}\right)$$

- **Problem 1407: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^3\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 408 leaves, 8 steps):

$$\frac{\left(A\, b^4-3\, a^4\, C+a^2\, b^2\, (5\, A+9\, C)\right) \sqrt{\text{Cos}[c+d\, x]}\ \text{EllipticE}\left[\frac{1}{2}\, (c+d\, x),\, 2\right] \sqrt{\text{Sec}[c+d\, x]}}{4\, a\, b^2\, \left(a^2-b^2\right)^2\, d}+$$

$$\frac{\left(a^2\, b^2\, (3\, A-5\, C)+3\, a^4\, C+b^4\, (3\, A+8\, C)\right) \sqrt{\text{Cos}[c+d\, x]}\ \text{EllipticF}\left[\frac{1}{2}\, (c+d\, x),\, 2\right] \sqrt{\text{Sec}[c+d\, x]}}{4\, b^3\, \left(a^2-b^2\right)^2\, d}+\frac{1}{4\, a\, (a-b)^2\, b^3\, (a+b)^3\, d}$$

$$\left(A\, b^6-3\, a^4\, b^2\, (A-2\, C)-3\, a^6\, C-5\, a^2\, b^4\, (2\, A+3\, C)\right) \sqrt{\text{Cos}[c+d\, x]}\ \text{EllipticPi}\left[\frac{2\, b}{a+b},\, \frac{1}{2}\, (c+d\, x),\, 2\right] \sqrt{\text{Sec}[c+d\, x]}-$$

$$\frac{\left(A\, b^2+a^2\, C\right) \text{Sin}[c+d\, x]}{2\, b\, \left(a^2-b^2\right)\, d\, (a+b\, \text{Cos}[c+d\, x])^2 \sqrt{\text{Sec}[c+d\, x]}}-\frac{\left(A\, b^4-3\, a^4\, C+a^2\, b^2\, (5\, A+9\, C)\right) \text{Sin}[c+d\, x]}{4\, a\, b\, \left(a^2-b^2\right)^2\, d\, (a+b\, \text{Cos}[c+d\, x]) \sqrt{\text{Sec}[c+d\, x]}}$$

Result (type 4, 821 leaves) :

$$-\frac{1}{16\, a\, (a-b)^2\, b\, (a+b)^2\, d}$$

$$\Bigg(-\Bigg(2\, \left(-16\, a^3\, A\, b-8\, a\, A\, b^3-8\, a^3\, b\, C-16\, a\, b^3\, C\right) \text{Cos}[c+d\, x]^2\, \text{EllipticPi}\left[-\frac{a}{b},\, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right] (b+a\, \text{Sec}[c+d\, x])$$

$$\sqrt{1-\text{Sec}[c+d\, x]^2}\ \text{Sin}[c+d\, x]\Bigg) \Big/ \left(b\, (a+b\, \text{Cos}[c+d\, x]) \left(1-\text{Cos}[c+d\, x]^2\right)\right)+\Bigg(2\, \left(9\, a^2\, A\, b^2-3\, A\, b^4+a^4\, C+5\, a^2\, b^2\, C\right)$$

$$\text{Cos}[c+d\, x]^2\, \left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right]+\text{EllipticPi}\left[-\frac{a}{b},\, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right]\right)$$

$$(b+a\, \text{Sec}[c+d\, x]) \sqrt{1-\text{Sec}[c+d\, x]^2}\ \text{Sin}[c+d\, x]\Bigg) \Big/ \left(a\, (a+b\, \text{Cos}[c+d\, x]) \left(1-\text{Cos}[c+d\, x]^2\right)\right)+$$

$$\Bigg(\Big(-5\, a^2\, A\, b^2-A\, b^4+3\, a^4\, C-9\, a^2\, b^2\, C\Big) \text{Cos}[2\, (c+d\, x)]\, (b+a\, \text{Sec}[c+d\, x]) \Big(-4\, a\, b+4\, a\, b\, \text{Sec}[c+d\, x]^2-$$

$$4\, a\, b\, \text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right] \sqrt{\text{Sec}[c+d\, x]}\ \sqrt{1-\text{Sec}[c+d\, x]^2}+2\, (2\, a-b)\, b\, \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right]$$

$$\sqrt{\text{Sec}[c+d\, x]}\ \sqrt{1-\text{Sec}[c+d\, x]^2}+4\, a^2\, \text{EllipticPi}\left[-\frac{a}{b},\, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right] \sqrt{\text{Sec}[c+d\, x]}\ \sqrt{1-\text{Sec}[c+d\, x]^2}-$$

$$2\, b^2\, \text{EllipticPi}\left[-\frac{a}{b},\, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\, x]}\right],\, -1\right] \sqrt{\text{Sec}[c+d\, x]}\ \sqrt{1-\text{Sec}[c+d\, x]^2}\Big)\, \text{Sin}[c+d\, x]\Bigg) \Big/$$

$$\left(a\, b^2\, (a+b\, \text{Cos}[c+d\, x]) \left(1-\text{Cos}[c+d\, x]^2\right) \sqrt{\text{Sec}[c+d\, x]}\ \left(2-\text{Sec}[c+d\, x]^2\right)\right)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Sec}[c+d\, x]}\ \Bigg(\frac{\left(-5\, a^2\, A\, b^2-A\, b^4+3\, a^4\, C-9\, a^2\, b^2\, C\right) \text{Sin}[c+d\, x]}{4\, a\, b^2\, \left(a^2-b^2\right)^2}-\frac{a\, A\, b^2\, \text{Sin}[c+d\, x]+a^3\, C\, \text{Sin}[c+d\, x]}{2\, b^2\, \left(-a^2+b^2\right)\, (a+b\, \text{Cos}[c+d\, x])^2}+$$

$$\frac{3\, a^2\, A\, b^2\, \text{Sin}[c+d\, x]+3\, A\, b^4\, \text{Sin}[c+d\, x]-5\, a^4\, C\, \text{Sin}[c+d\, x]+11\, a^2\, b^2\, C\, \text{Sin}[c+d\, x]}{4\, b^2\, \left(-a^2+b^2\right)^2\, (a+b\, \text{Cos}[c+d\, x])}\Bigg)$$

## Problem 1408: Result more than twice size of optimal antiderivative.

$$\int \frac{A + C \operatorname{Cos}[c + d x]^2}{(a + b \operatorname{Cos}[c + d x])^3 \operatorname{Sec}[c + d x]^{3/2}} \, dx$$

Optimal (type 4, 405 leaves, 8 steps):

$$-\frac{\left(b^4 (5 A - 8 C) - 15 a^4 C + a^2 b^2 (A + 29 C)\right) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{4 b^3 \left(a^2 - b^2\right)^2 d} - \frac{a \left(15 a^4 C + b^4 (7 A + 24 C) - a^2 b^2 (A + 33 C)\right) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]}}{4 b^4 \left(a^2 - b^2\right)^2 d} + \frac{1}{4 (a - b)^2 b^4 (a + b)^3 d} \left(3 A b^6 + 15 a^6 C + 5 a^2 b^4 (2 A + 7 C) - a^4 b^2 (A + 38 C)\right) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{EllipticPi}\left[\frac{2 b}{a + b}, \frac{1}{2} (c + d x), 2\right] \sqrt{\operatorname{Sec}[c + d x]} - \frac{\left(A b^2 + a^2 C\right) \operatorname{Sin}[c + d x]}{2 b \left(a^2 - b^2\right) d (a + b \operatorname{Cos}[c + d x])^2 \operatorname{Sec}[c + d x]^{3/2}} + \frac{\left(3 A b^4 - 5 a^4 C + a^2 b^2 (3 A + 11 C)\right) \operatorname{Sin}[c + d x]}{4 b^2 \left(a^2 - b^2\right)^2 d (a + b \operatorname{Cos}[c + d x]) \sqrt{\operatorname{Sec}[c + d x]}}$$

Result (type 4, 824 leaves):

$$\frac{1}{16\,(a-b)^2\,b^2\,(a+b)^2\,d}$$

$$\Bigg(-\Big(2\,\big(-24\,a\,A\,b^3+8\,a^3\,b\,C-32\,a\,b^3\,C\big)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}$$

$$\text{Sin}[c+d\,x]\Big)\Big/\,\big(b\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\big)+\Big(2\,\big(5\,a^2\,A\,b^2+A\,b^4+5\,a^4\,C-7\,a^2\,b^2\,C+8\,b^4\,C\big)$$

$$\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)$$

$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\,\text{Sin}[c+d\,x]\Big)\Big/\,\big(a\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\big)+$$

$$\Big(\big(-a^2\,A\,b^2-5\,A\,b^4+15\,a^4\,C-29\,a^2\,b^2\,C+8\,b^4\,C\big)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-$$

$$4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]$$

$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$

$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},\,-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Big)\,\text{Sin}[c+d\,x]\Big)\Big/$$

$$\Big(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\big(1-\text{Cos}[c+d\,x]^2\big)\,\sqrt{\text{Sec}[c+d\,x]}\,\,\big(2-\text{Sec}[c+d\,x]^2\big)\Big)\Bigg)+\frac{1}{d}$$

$$\sqrt{\text{Sec}[c+d\,x]}\,\,\Bigg(-\frac{\big(-a^2\,A\,b^2-5\,A\,b^4+7\,a^4\,C-13\,a^2\,b^2\,C\big)\,\text{Sin}[c+d\,x]}{4\,b^3\,\big(a^2-b^2\big)^2}-\frac{-a^2\,A\,b^2\,\text{Sin}[c+d\,x]-a^4\,C\,\text{Sin}[c+d\,x]}{2\,b^3\,\big(-a^2+b^2\big)\,(a+b\,\text{Cos}[c+d\,x])^2}+$$

$$\frac{a^3\,A\,b^2\,\text{Sin}[c+d\,x]-7\,a\,A\,b^4\,\text{Sin}[c+d\,x]+9\,a^5\,C\,\text{Sin}[c+d\,x]-15\,a^3\,b^2\,C\,\text{Sin}[c+d\,x]}{4\,b^3\,\big(-a^2+b^2\big)^2\,(a+b\,\text{Cos}[c+d\,x])}\Bigg)$$

- **Problem 1411: Attempted integration timed out after 120 seconds.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\big(A+C\,\text{Cos}[c+d\,x]^2\big)\,\text{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 544 leaves, 8 steps):

$$-\frac{1}{315\,a^5\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(16\,A\,b^4+6\,a^2\,b^2\,(4\,A+7\,C)-21\,a^4\,(7\,A+9\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{315\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(12\,a\,A\,b^2+16\,A\,b^3+6\,a^2\,b\,(6\,A+7\,C)+21\,a^3\,(7\,A+9\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{2\,b\,\left(8\,A\,b^2+a^2\,(13\,A+21\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,a^3\,d}-$$

$$\frac{2\,\left(6\,A\,b^2-7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{315\,a^2\,d}+$$

$$\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,a\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1412: Unable to integrate problem.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 455 leaves, 7 steps) :

$$\frac{1}{105\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,b\,\sqrt{a+b}\,\left(8\,A\,b^2+a^2\,(19\,A+35\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{105\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$2\,(a-b)\,\sqrt{a+b}\,\left(6\,a\,A\,b+8\,A\,b^2+5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{2\,\left(4\,A\,b^2-5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,a^2\,d}+$$

$$\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,a\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,d}$$

Result (type 8, 39 leaves) :

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

- **Problem 1413: Attempted integration timed out after 120 seconds.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}\,dx$$

Optimal (type 4, 385 leaves, 6 steps) :

$$-\frac{1}{15\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(2\,A\,b^2-3\,a^2\,(3\,A+5\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{15\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\,(9\,a\,A+2\,A\,b+15\,a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1416: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 515 leaves, 8 steps):

$$-\frac{1}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\,C\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,(8\,A\,b+(a+2\,b)\,C)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(a^2\,C-4\,b^2\,(2\,A+C)\right)\sqrt{\text{Cos}[c+d\,x]}$$
$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{C\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,C\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1391 leaves):

$$\frac{C\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{4\,d}+$$
$$\left(-a^2\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-a\,b\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+2\,a\,b\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+a^2\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-\right.$$
$$a\,b\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+16\,i\,A\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$
$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-2\,i\,a^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$8\,i\,b^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;+16\,i\,A\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;-$$

$$2\,i\,a^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;+8\,i\,b^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;-$$

$$i\,a\,(a-b)\,C\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;+2\,i\,(a-b)\,(4\,A\,b+(a+2\,b)\,C)\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\Big/$$

$$\left(4\,b\,\sqrt{\frac{a-b}{a+b}}\,d\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)$$

- **Problem 1417: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 613 leaves, 9 steps) :

$$\frac{1}{24\,a\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(3\,a^2\,C-8\,b^2\,(3\,A+2\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]\,\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{24\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(3\,a^2\,C-2\,a\,b\,C-8\,b^2\,(3\,A+2\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]\,\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}a\,\sqrt{a+b}\,\left(8\,A\,b^2+\left(a^2+4\,b^2\right)\,C\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]\,\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\,\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{a\,C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{C\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}-\frac{\left(3\,a^2\,C-8\,b^2\,(3\,A+2\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\,\mathrm{Sin}[c+d\,x]}{24\,b^2\,d}$$

Result (type 4, 1317 leaves) :

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\,\left(\frac{1}{12}\,C\,\mathrm{Sin}[c+d\,x]+\frac{a\,C\,\mathrm{Sin}[2\,(c+d\,x)]}{24\,b}+\frac{1}{12}\,C\,\mathrm{Sin}[3\,(c+d\,x)]\right)}{d}+$$

$$\left(\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right.$$

$$\left(-24\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-24\,A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-16\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-\right.$$

$$16\,b^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+48\,A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-6\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+32\,b^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+24\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$24\,A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-3\,a^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+16\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-16\,b^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$48\,a\,A\,b^2\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$6 a^3 C \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$24 a b^2 C \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$48 a A b^2 \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} + 6 a^3 C \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} + 24 a b^2 C \,\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$(a+b)\left(-24 A b^2+3 a^2 C-16 b^2 C\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} - 2 a b (-24 A b + (a-14 b) C) \,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)\right) \Big/$$

$$\left(24 b^2 d \sqrt{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \left(b \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) - a \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\right)$$

- **Problem 1418: Result more than twice size of optimal antiderivative.**

$$\int \frac{\sqrt{a+b \,\text{Cos}[c+d x]} \left(A+C \,\text{Cos}[c+d x]^2\right)}{\text{Sec}[c+d x]^{3/2}} \, dx$$

Optimal (type 4, 698 leaves, 10 steps) :

$$-\frac{1}{192 b^3 d \sqrt{\text{Sec}[c+d x]}}(a-b) \sqrt{a+b} \left(48 A b^2+15 a^2 C+28 b^2 C\right) \sqrt{\text{Cos}[c+d x]}$$
$$\text{Csc}[c+d x]\, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{1}{192 b^3 d \sqrt{\text{Sec}[c+d x]}}\sqrt{a+b} \left(15 a^3 C-10 a^2 b C+24 b^3 (4 A+3 C)+4 a b^2 (12 A+7 C)\right) \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{1}{64 b^4 d \sqrt{\text{Sec}[c+d x]}}\sqrt{a+b} \left(5 a^4 C+8 a^2 b^2 (2 A+C)-16 b^4 (4 A+3 C)\right) \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]$$
$$\text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}+$$
$$\frac{C (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{4 b d \text{Sec}[c+d x]^{3/2}}+\frac{\left(5 a^2 C+4 b^2 (4 A+3 C)\right) \sqrt{a+b \text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{32 b^2 d \sqrt{\text{Sec}[c+d x]}}-$$
$$\frac{5 a C (a+b \text{Cos}[c+d x])^{3/2} \text{Sin}[c+d x]}{24 b^2 d \sqrt{\text{Sec}[c+d x]}}+\frac{a \left(48 A b^2+15 a^2 C+28 b^2 C\right) \sqrt{a+b \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}\, \text{Sin}[c+d x]}{192 b^3 d}$$

Result (type 4, 3838 leaves):

$$\frac{1}{d}\sqrt{a+b \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]} \left(\frac{a C \text{Sin}[c+d x]}{96 b}+\frac{\left(48 A b^2-5 a^2 C+48 b^2 C\right) \text{Sin}[2 (c+d x)]}{192 b^2}+\frac{a C \text{Sin}[3 (c+d x)]}{96 b}+\frac{1}{32} C \text{Sin}[4 (c+d x)]\right)+$$
$$\Bigg(\left(\frac{A b}{2 \sqrt{a+b \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}+\frac{a^2 C}{96 b \sqrt{a+b \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}+\right.$$
$$\frac{3 b C}{8 \sqrt{a+b \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}}+\frac{3 a A \sqrt{\text{Sec}[c+d x]}}{8 \sqrt{a+b \text{Cos}[c+d x]}}+\frac{25 a C \sqrt{\text{Sec}[c+d x]}}{96 \sqrt{a+b \text{Cos}[c+d x]}}+\frac{5 a^3 C \sqrt{\text{Sec}[c+d x]}}{384 b^2 \sqrt{a+b \text{Cos}[c+d x]}}+$$
$$\left.\frac{a A \text{Cos}[2 (c+d x)] \sqrt{\text{Sec}[c+d x]}}{8 \sqrt{a+b \text{Cos}[c+d x]}}+\frac{7 a C \text{Cos}[2 (c+d x)] \sqrt{\text{Sec}[c+d x]}}{96 \sqrt{a+b \text{Cos}[c+d x]}}+\frac{5 a^3 C \text{Cos}[2 (c+d x)] \sqrt{\text{Sec}[c+d x]}}{128 b^2 \sqrt{a+b \text{Cos}[c+d x]}}\right)$$

$$-\left(\left(\left(\left(a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+\right.\right.\right.\right.\right.$$

$$\left.24\,b^3\,(4\,A+3\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+6\,\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\right.$$

$$\left.\left.-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)\Big/$$

$$\left.\left(192\,b^3\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)+$$

$$\left.\left.\frac{a\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{192\,b^3\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\right)\right)\Big/$$

$$\left(d\,\left(\left(\left(a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-\right.\right.\right.\right.$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+24\,b^3\,(4\,A+3\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$\left.6\,\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\left.\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\Big/\left(192\,b^3\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right.$$

$$\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\;\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)+$$

$$\Bigg(\Bigg(a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+24\,b^3\,(4\,A+3\,C)\right)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\,\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\left(a\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\;\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(384\,b^3\,(a+b)^2\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\;\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\left(\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}\right)^{3/2}\right)+$$

$$\Bigg(\Bigg(a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+24\,b^3\,(4\,A+3\,C)\right)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\,\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\;\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(192\,b^3\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\;\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)+$$

$$\Bigg(\Bigg(a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+24\,b^3\,(4\,A+3\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\,\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(384\,b^3\,(a+b)\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)+$$

$$\Bigg(a\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\Bigg(-\frac{b\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}-$$

$$\frac{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(b-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\Bigg)\Bigg)\Bigg/\left(384\,b^3\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)+$$

$$\frac{a\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{384\,b^3\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}-\Bigg(a\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\left(\frac{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}+\frac{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\right)\,\sqrt{a+\frac{b-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\Bigg)\Bigg/$$

$$\left(384\,b^3\,\left(\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{3/2}\right)-\Bigg(\Bigg(a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$2\,b\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+24\,b^3\,(4\,A+3\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\,\left(\frac{a\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}-\right.$$

$$\left.\left.\frac{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\left(a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\right)\right)\Big/$$

$$\left(384\,b^3\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right.$$

$$\left.\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)-\left(\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right.$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\,\left(-\frac{b\left(5\,a^3\,C+2\,a^2\,b\,C-12\,a\,b^2\,(4\,A+3\,C)+24\,b^3\,(4\,A+3\,C)\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-\right.$$

$$\frac{3\left(5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+$$

$$\left.\left.\frac{a\,(a+b)\,\left(48\,A\,b^2+15\,a^2\,C+28\,b^2\,C\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}{2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\right)\Big/$$

$$\left(192\, b^3\, (a+b)\, \sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\, \left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\Bigg)\Bigg)$$

- **Problem 1419: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 542 leaves, 8 steps):

$$\frac{1}{315\,a^4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^4+21\,a^4\,(7\,A+9\,C)+3\,a^2\,b^2\,(11\,A+21\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,+$$
$$\frac{1}{315\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(6\,a\,A\,b^2+8\,A\,b^3-21\,a^3\,(7\,A+9\,C)+a^2\,(39\,A\,b+63\,b\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,-$$
$$\frac{4\,b\,\left(2\,A\,b^2-a^2\,(44\,A+63\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{315\,a^2\,d}\,+$$
$$\frac{2\,\left(3\,A\,b^2+7\,a^2\,(7\,A+9\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{315\,a\,d}\,+$$
$$\frac{2\,A\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{21\,d}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{9/2}\,\mathrm{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 1420: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 458 leaves, 7 steps):

$$-\frac{1}{105 a^3 d \sqrt{\operatorname{Sec}[c+d x]}} 4 (a-b) b \sqrt{a+b} \left(3 A b^2-a^2 (41 A+70 C)\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{1}{105 a^2 d \sqrt{\operatorname{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \left(25 a^2 A-57 a A b-6 A b^2+35 a^2 C-105 a b C\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{2 \left(3 A b^2+5 a^2 (5 A+7 C)\right) \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{105 a d}+\frac{6 A b \sqrt{a+b \operatorname{Cos}[c+d x]} \operatorname{Sec}[c+d x]^{5/2} \operatorname{Sin}[c+d x]}{35 d}+\frac{2 A (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^{7/2} \operatorname{Sin}[c+d x]}{7 d}$$

Result (type 1, 1 leaves) :

???

## Problem 1422: Result more than twice size of optimal antiderivative.

$$\int (a+b \operatorname{Cos}[c+d x])^{3/2} \left(A+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^{5/2} \, dx$$

Optimal (type 4, 560 leaves, 9 steps) :

$$\frac{1}{3 a d \sqrt{\operatorname{Sec}[c+d x]}} (a-b) b \sqrt{a+b} (8 A-3 C) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{1}{3 a d \sqrt{\operatorname{Sec}[c+d x]}} \sqrt{a+b} \left(6 A b^2+2 a^2 (A+3 C)-a (8 A b-3 b C)\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}-\frac{1}{d \sqrt{\operatorname{Sec}[c+d x]}} 3 a \sqrt{a+b} C \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[\frac{a+b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{2 A b \sqrt{a+b \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{d}-\frac{b (8 A-3 C) \sqrt{a+b \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{3 d}+\frac{2 A (a+b \operatorname{Cos}[c+d x])^{3/2} \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{3 d}$$

Result (type 4, 3392 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}\ \left(\frac{8}{3}\,A\,b\,\text{Sin}[c+d\,x]+\frac{2}{3}\,a\,A\,\text{Tan}[c+d\,x]\right)}{d}+$$

$$\left(\left(\left(-\frac{4\,a\,A\,b}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}+\frac{2\,a\,b\,C}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}+\right.\right.\right.$$

$$\frac{a^2\,A\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{A\,b^2\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{a^2\,C\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b^2\,C\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left.\frac{4\,A\,b^2\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b^2\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right)\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}$$

$$\left(-2\,b\,(a+b)\,(8\,A-3\,C)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\ \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.$$

$$4\,\left(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\ \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$36\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\ \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]-$$

$$\left.\left.b\,(8\,A-3\,C)\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)\right)\Big/$$

$$\left(3\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\ \left(\frac{1}{6\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,b\,\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}\right.\right.$$

$$\text{Sin}[c+d\,x]\,\left(-2\,b\,(a+b)\,(8\,A-3\,C)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\ \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.$$

$$4\,\left(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\ \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\right.$$

$$\frac{-a+b}{a+b}\Big] - 36\,a\,b\,C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big] -$$

$$b\,(8\,A-3\,C)\,\mathrm{Cos}[c+d\,x]\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg) -$$

$$\frac{1}{6\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}\,\sqrt{\mathrm{Cos}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\mathrm{Sec}[c+d\,x]}\,\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]$$

$$\Bigg(-2\,b\,(a+b)\,(8\,A-3\,C)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big] +$$

$$4\,\big(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\big)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],$$

$$\frac{-a+b}{a+b}\Big] - 36\,a\,b\,C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big] -$$

$$b\,(8\,A-3\,C)\,\mathrm{Cos}[c+d\,x]\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Bigg) + \frac{1}{3\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}\big[\frac{1}{2}\,(c+d\,x)\big]^2}}$$

$$\sqrt{\mathrm{Cos}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\mathrm{Sec}[c+d\,x]}\,\Bigg(-\frac{1}{2}\,b\,(8\,A-3\,C)\,\mathrm{Cos}[c+d\,x]\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^4 - \frac{1}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}\,b\,(a+b)$$

$$(8\,A-3\,C)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right) +$$

$$\frac{1}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}\,2\,\big(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\big)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]$$

$$\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)-\frac{1}{\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}}18\,a\,b\,C\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{EllipticPi}\Big[-1,$$

$$-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\left(\frac{\text{Cos}[c+d\,x]\,\text{Sin}[c+d\,x]}{(1+\text{Cos}[c+d\,x])^2}-\frac{\text{Sin}[c+d\,x]}{1+\text{Cos}[c+d\,x]}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}b\,(a+b)\,(8\,A-3\,C)$$

$$\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}2\,\left(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\;\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]$$

$$\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)-\frac{1}{\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}}18\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}$$

$$\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\left(-\frac{b\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}+\frac{(a+b\,\text{Cos}[c+d\,x])\,\text{Sin}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])^2}\right)+$$

$$b^2\,(8\,A-3\,C)\,\text{Cos}[c+d\,x]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Sin}[c+d\,x]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+b\,(8\,A-3\,C)\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2$$

$$\text{Sin}[c+d\,x]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-b\,(8\,A-3\,C)\,\text{Cos}[c+d\,x]\,(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2+$$

$$\frac{2\,\left(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\right)\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}{\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{18\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\;\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}{\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\left(1+\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\right)\sqrt{1-\frac{(-a+b)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}-\left(b\,(a+b)\,(8\,A-3\,C)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\right.$$

$$\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\ \mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\Bigg)\Bigg/\left(\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)\Bigg)+$$

$$\Bigg(\Bigg(-2\,b\,(a+b)\,(8\,A-3\,C)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\ \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]+$$

$$4\,\left(3\,A\,b^2+a^2\,(A+3\,C)+a\,(4\,A\,b-6\,b\,C)\right)\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\ \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\right.$$

$$\left.\frac{-a+b}{a+b}\right]-36\,a\,b\,C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\ \mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\ \frac{-a+b}{a+b}\right]-$$

$$b\,(8\,A-3\,C)\,\mathrm{Cos}[c+d\,x]\,(a+b\,\mathrm{Cos}[c+d\,x])\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\Bigg)$$

$$\left(-\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]\mathrm{Sec}[c+d\,x]\,\mathrm{Sin}\left[\frac{1}{2}\,(c+d\,x)\right]+\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]\,\mathrm{Tan}[c+d\,x]\right)\Bigg)\Bigg/$$

$$\left(6\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Sec}[c+d\,x]}\right)\Bigg)\Bigg)$$

- **Problem 1423: Result more than twice size of optimal antiderivative.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 569 leaves, 9 steps) :

$$\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\,(8\,A-5\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\,(8\,a\,A-16\,A\,b-5\,a\,C-2\,b\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{1}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\,\left(8\,A\,b^2+3\,a^2\,C+4\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-\frac{b\,(4\,A-C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\,-$$

$$\frac{a\,(8\,A-5\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{4\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{d}$$

Result (type 4, 1178 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}\,\,\left(2\,a\,A\,\text{Sin}[c+d\,x]+\frac{1}{4}\,b\,C\,\text{Sin}[2\,(c+d\,x)]\right)}{d}+$$

$$\Big(8\,a^2\,A\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+8\,a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-5\,a^2\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-5\,a\,b\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-16\,a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+$$

$$10\,a\,b\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-8\,a^2\,A\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+8\,a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+5\,a^2\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-5\,a\,b\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+$$

$$16\,A\,b^2\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}\,+$$

$$6\,a^2\,C\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}\,+$$

$$8\,b^2\,C\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\,\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}\,+$$

$$16\,A\,b^2\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,a^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$8\,b^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+a\,(a+b)\,(8\,A-5\,C)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$2\,\left(4\,a^2\,(A-C)-2\,b^2\,(2\,A+C)+a\,b\,(8\,A+C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\left.\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\Bigg/$$

$$\left(4\,d\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)$$

- **Problem 1424: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,dx$$

Optimal (type 4, 613 leaves, 9 steps):

$$-\frac{1}{24\,a\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\,\left(3\,a^2\,C+8\,b^2\,(3\,A+2\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{24\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(48\,a\,A\,b+24\,A\,b^2+3\,a^2\,C+14\,a\,b\,C+16\,b^2\,C\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$a\,\sqrt{a+b}\,\left(24\,A\,b^2-a^2\,C+12\,b^2\,C\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{a\,C\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+$$

$$\frac{C\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}+\frac{\left(3\,a^2\,C+8\,b^2\,(3\,A+2\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{24\,b\,d}$$

Result (type 4, 1285 leaves):

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(\frac{1}{12}\,b\,C\,\mathrm{Sin}[c+d\,x]+\frac{7}{24}\,a\,C\,\mathrm{Sin}[2\,(c+d\,x)]+\frac{1}{12}\,b\,C\,\mathrm{Sin}[3\,(c+d\,x)]\right)}{d}+$$

$$\frac{1}{24\,b\,d\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(24\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+24\,A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+16\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$16\,b^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-48\,A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-6\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-32\,b^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-24\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$24\,A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-3\,a^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-16\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+16\,b^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$144\,a\,A\,b^2\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$6\,a^3\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$72\,a\,b^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$144\,a\,A\,b^2\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,a^3\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-72\,a\,b^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$(a+b)\,\left(24\,A\,b^2+3\,a^2\,C+16\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+2\,a\,b\,(24\,a\,A-48\,A\,b+7\,a\,C-26\,b\,C)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 1425: Result more than twice size of optimal antiderivative.**

$$\int\frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 698 leaves, 10 steps):

$$-\frac{1}{64 b^2 d \sqrt{\text{Sec}[c+d x]}}(a-b)\sqrt{a+b}\left(80 A b^2-3 a^2 C+52 b^2 C\right)\sqrt{\text{Cos}[c+d x]}$$

$$\text{Csc}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{1}{64 b^2 d \sqrt{\text{Sec}[c+d x]}}\sqrt{a+b}\left(3 a^3 C-2 a^2 b C-8 b^3 (4 A+3 C)-4 a b^2 (20 A+13 C)\right)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{1}{64 b^3 d \sqrt{\text{Sec}[c+d x]}}\sqrt{a+b}\left(3 a^4 C+24 a^2 b^2 (2 A+C)+16 b^4 (4 A+3 C)\right)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{\left(3 a^2 C-4 b^2 (4 A+3 C)\right)\sqrt{a+b\,\text{Cos}[c+d x]}\,\text{Sin}[c+d x]}{32 b d \sqrt{\text{Sec}[c+d x]}}-\frac{a C (a+b\,\text{Cos}[c+d x])^{3/2}\,\text{Sin}[c+d x]}{8 b d \sqrt{\text{Sec}[c+d x]}}+$$

$$\frac{C (a+b\,\text{Cos}[c+d x])^{5/2}\,\text{Sin}[c+d x]}{4 b d \sqrt{\text{Sec}[c+d x]}}+\frac{a\left(80 A b^2-3 a^2 C+52 b^2 C\right)\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{64 b^2 d}$$

Result (type 4, 4000 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}$$

$$\left(\frac{3}{32} a C\,\text{Sin}[c+d x]+\frac{\left(16 A b^2+a^2 C+16 b^2 C\right)\text{Sin}[2 (c+d x)]}{64 b}+\frac{3}{32} a C\,\text{Sin}[3 (c+d x)]+\frac{1}{32} b C\,\text{Sin}[4 (c+d x)]\right)+$$

$$\left(\left(\frac{a^2 A}{\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}+\frac{A b^2}{2\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}+\frac{19 a^2 C}{32\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}+\right.\right.$$

$$\frac{3 b^2 C}{8\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}}+\frac{7 a A b\sqrt{\text{Sec}[c+d x]}}{8\sqrt{a+b\,\text{Cos}[c+d x]}}-\frac{a^3 C\sqrt{\text{Sec}[c+d x]}}{128 b\sqrt{a+b\,\text{Cos}[c+d x]}}+\frac{19 a b C\sqrt{\text{Sec}[c+d x]}}{32\sqrt{a+b\,\text{Cos}[c+d x]}}+$$

$$\left.\frac{5\,a\,A\,b\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{3\,a^3\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{128\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{13\,a\,b\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{32\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right)$$

$$\left(-\frac{a\,\left(-80\,A\,b^2+3\,a^2\,C-52\,b^2\,C\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{64\,b^2\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}+\right.$$

$$\left(\left(a\,(a+b)\,\left(-80\,A\,b^2+3\,a^2\,C-52\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+2\,b\,\left(-a^3\,C-4\,a\,b^2\,(4\,A+3\,C)+8\,b^3\,(4\,A+3\,C)+\right.\right.\right.$$

$$\left.a^2\,(64\,A\,b+38\,b\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+2\,\left(3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)$$

$$\left.\left.\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)\Big/$$

$$\left.\left.\left(64\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\right)\Big/$$

$$\left(d\,\left(-\frac{a\,\left(-80\,A\,b^2+3\,a^2\,C-52\,b^2\,C\right)\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{128\,b^2\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}-\right.\right.$$

$$\left(\left(a\,(a+b)\,\left(-80\,A\,b^2+3\,a^2\,C-52\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\,\left(-a^3\,C-4\,a\,b^2\,(4\,A+3\,C)+8\,b^3\,(4\,A+3\,C)+a^2\,(64\,A\,b+38\,b\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$2\left(3a^4C+24a^2b^2(2A+C)+16b^4(4A+3C)\right)\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\right)\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2$$

$$\left.\text{Tan}\left[\frac{1}{2}(c+dx)\right]^3\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\right)\Bigg/\left(64b^2(a+b)\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\right.$$

$$\left.\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4}\right)-$$

$$\left(\left(a(a+b)\left(-80Ab^2+3a^2C-52b^2C\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2b\left(-a^3C-4ab^2(4A+3C)+8b^3(4A+3C)+a^2(64Ab+38bC)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.2\left(3a^4C+24a^2b^2(2A+C)+16b^4(4A+3C)\right)\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\left(a\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]-b\,\text{Sec}\left[\frac{1}{2}(c+dx)\right]^2\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right)$$

$$\left.\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^4}\right)\Bigg/$$

$$\left(128b^2(a+b)^2\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\left(\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}\right)^{3/2}\right)-$$

$$\left(\left(a(a+b)\left(-80Ab^2+3a^2C-52b^2C\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2b\left(-a^3C-4ab^2(4A+3C)+8b^3(4A+3C)+a^2(64Ab+38bC)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.2\left(3a^4C+24a^2b^2(2A+C)+16b^4(4A+3C)\right)\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg) \Big/$$

$$\left(64 b^2 (a+b) \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2 \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right) -$$

$$\Bigg(\Bigg(a (a+b) \left(-80 A b^2+3 a^2 C-52 b^2 C\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] +$$

$$2 b \left(-a^3 C-4 a b^2 (4 A+3 C)+8 b^3 (4 A+3 C)+a^2 (64 A b+38 b C)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] +$$

$$2 \left(3 a^4 C+24 a^2 b^2 (2 A+C)+16 b^4 (4 A+3 C)\right) \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]\Bigg) \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right] \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\Bigg) \Big/$$

$$\left(128 b^2 (a+b) \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right) +$$

$$\Bigg(a \left(-80 A b^2+3 a^2 C-52 b^2 C\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right] \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}$$

$$\left(\frac{\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}+\frac{\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2}\right)\Bigg) \Big/ \left(128 b^2 \left(\frac{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{3/2}\right) -$$

$$\Bigg(a \left(-80 A b^2+3 a^2 C-52 b^2 C\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right] \Bigg(\frac{a\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]-b\,\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} -$$

$$\frac{\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] \left(a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2}\Bigg)\Bigg) \Big/$$

$$\left(128\, b^2 \sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}} \sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)+$$

$$\left(\left(a\,(a+b)\left(-80\,A\,b^2+3\,a^2\,C-52\,b^2\,C\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\left(-a^3\,C-4\,a\,b^2\,(4\,A+3\,C)+8\,b^3\,(4\,A+3\,C)+a^2\,(64\,A\,b+38\,b\,C)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.2\left(3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\left(\frac{a\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}-\right.$$

$$\left.\left.\frac{\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\left(a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)}{\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2}\right)\right)\Big/$$

$$\left(128\,b^2\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right.$$

$$\left.\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)+\left(\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right.$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\left(\frac{b\left(-a^3\,C-4\,a\,b^2\,(4\,A+3\,C)+8\,b^3\,(4\,A+3\,C)+a^2\,(64\,A\,b+38\,b\,C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}-\right.$$

$$\frac{\left(3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+$$

$$\left.\left.\frac{a\,(a+b)\,\left(-80\,A\,b^2+3\,a^2\,C-52\,b^2\,C\right)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}{2\,\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\right)\Big/$$

$$\left.\left.\left(64\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\right)$$

- **Problem 1426: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{13/2}\,dx$$

Optimal (type 4, 627 leaves, 9 steps):

$$\frac{1}{693\,a^4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,b\,\sqrt{a+b}\,\left(8\,A\,b^4+3\,a^2\,b^2\,(17\,A+33\,C)+a^4\,(741\,A+957\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,+$$
$$\frac{1}{693\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(6\,a\,A\,b^3+8\,A\,b^4+15\,a^4\,(9\,A+11\,C)+3\,a^2\,b^2\,(19\,A+33\,C)-6\,a^3\,b\,(101\,A+132\,C)\right)$$
$$\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,-$$
$$\frac{2\,\left(4\,A\,b^4-15\,a^4\,(9\,A+11\,C)-a^2\,b^2\,(205\,A+297\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{693\,a^2\,d}\,+$$
$$\frac{2\,b\,\left(3\,A\,b^2+a^2\,(229\,A+297\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{693\,a\,d}\,+$$
$$\frac{2\,\left(5\,A\,b^2+3\,a^2\,(9\,A+11\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{231\,d}\,+$$
$$\frac{10\,A\,b\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{9/2}\,\mathrm{Sin}[c+d\,x]}{99\,d}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{11/2}\,\mathrm{Sin}[c+d\,x]}{11\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 1427: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 544 leaves, 8 steps):

$$-\frac{1}{315\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^4-21\,a^4\,(7\,A+9\,C)-3\,a^2\,b^2\,(93\,A+161\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{315\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^3+21\,a^3\,(7\,A+9\,C)+15\,a\,b^2\,(11\,A+21\,C)-6\,a^2\,b\,(19\,A+28\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,b\,\left(5\,A\,b^2+a^2\,(163\,A+231\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,a\,d}+\frac{2\,\left(15\,A\,b^2+7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{315\,d}+\frac{10\,A\,b\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 1431: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 669 leaves, 10 steps):

$$\frac{1}{24\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\left(a^2\,(48\,A-33\,C)-8\,b^2\,(3\,A+2\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{24\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(a^2\,(48\,A-33\,C)-8\,b^2\,(3\,A+2\,C)-2\,a\,b\,(72\,A+13\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{8\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$5\,a\,\sqrt{a+b}\,\left(8\,A\,b^2+\left(a^2+4\,b^2\right)\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{a\,b\,(8\,A-3\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{b\,(6\,A-C)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}-$$

$$\frac{\left(a^2\,(48\,A-33\,C)-8\,b^2\,(3\,A+2\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 4, 1405 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\left(\frac{1}{12}\left(24\,a^2\,A+b^2\,C\right)\text{Sin}[c+d\,x]+\frac{13}{24}\,a\,b\,C\,\text{Sin}[2\,(c+d\,x)]+\frac{1}{12}\,b^2\,C\,\text{Sin}[3\,(c+d\,x)]\right)+$$

$$\frac{1}{24\,d\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(-48\,a^3\,A\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-48\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+24\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+24\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+33\,a^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$33\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+16\,a\,b^2\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+16\,b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+96\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-48\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-$$

$$66\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-32\,b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+48\,a^3\,A\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-48\,a^2\,A\,b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-24\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$24\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-33\,a^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+33\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-16\,a\,b^2\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+16\,b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$240\, a\, A\, b^2\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} -$$

$$30\, a^3\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} -$$

$$120\, a\, b^2\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} -$$

$$240\, a\, A\, b^2\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} - 30\, a^3\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} -$$

$$120\, a\, b^2\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} - (a+b)\left(a^2\,(48\,A-33\,C)-8\,b^2\,(3\,A+2\,C)\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} +$$

$$2\, a\left(24\, a^2\,(A-C)+a\, b\,(72\,A+13\,C)-2\, b^2\,(36\,A+19\,C)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 1433: Result more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 806 leaves, 11 steps):

$$\frac{1}{1920\,a\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(45\,a^4\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{1920\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$\sqrt{a+b}\,\left(45\,a^4\,C-30\,a^3\,b\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)-8\,a\,b^3\,(260\,A+193\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{128\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$a\,\sqrt{a+b}\,\left(3\,a^4\,C+40\,a^2\,b^2\,(2\,A+C)+80\,b^4\,(4\,A+3\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{a\,\left(240\,A\,b^2-15\,a^2\,C+172\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{320\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}-$$
$$\frac{\left(15\,a^2\,C-16\,b^2\,(5\,A+4\,C)\right)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{240\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{3\,a\,C\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{40\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$
$$\frac{C\,(a+b\,\text{Cos}[c+d\,x])^{7/2}\,\text{Sin}[c+d\,x]}{5\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{\left(45\,a^4\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}\,\,\text{Sin}[c+d\,x]}{1920\,b^2\,d}$$

Result (type 4, 2064 leaves):

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\sqrt{\text{Sec}[c+d\,x]}\,\,\left(\frac{1}{960}\,\left(80\,A\,b^2+93\,a^2\,C+88\,b^2\,C\right)\,\text{Sin}[c+d\,x]+\frac{a\,\left(1040\,A\,b^2+15\,a^2\,C+1024\,b^2\,C\right)\,\text{Sin}[2\,(c+d\,x)]}{1920\,b}+\right.$$
$$\left.\frac{1}{960}\,\left(80\,A\,b^2+93\,a^2\,C+100\,b^2\,C\right)\,\text{Sin}[3\,(c+d\,x)]+\frac{21}{320}\,a\,b\,C\,\text{Sin}[4\,(c+d\,x)]+\frac{1}{80}\,b^2\,C\,\text{Sin}[5\,(c+d\,x)]\right)+$$
$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right.$$
$$\left(-2640\,a^3\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-2640\,a^2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-1280\,a\,A\,b^4\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-1280\,A\,b^5\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$45\,a^5\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+45\,a^4\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-1692\,a^3\,b^2\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-1692\,a^2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-$$

$$1024\,a\,b^4\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-1024\,b^5\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+5280\,a^2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+2560\,A\,b^5\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-$$

$$90\,a^4\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+3384\,a^2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+2048\,b^5\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3+2640\,a^3\,A\,b^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$2640\,a^2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+1280\,a\,A\,b^4\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-1280\,A\,b^5\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-45\,a^5\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$45\,a^4\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+1692\,a^3\,b^2\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-1692\,a^2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+1024\,a\,b^4\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$1024\,b^5\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+2400\,a^3\,A\,b^2\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+9600\,a\,A\,b^4\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+90\,a^5\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+1200\,a^3\,b^2\,C$$

$$\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+7200$$

$$a\,b^4\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$2400\,a^3\,A\,b^2\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+9600\,a\,A\,b^4\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+90a^5C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\tan\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\tan\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$1200a^3b^2C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\tan\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\tan\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}$$

$$\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+7200ab^4C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\tan\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\tan\left[\frac{1}{2}(c+dx)\right]^2\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}+$$

$$(a+b)\left(45a^4C-256b^4(5A+4C)-12a^2b^2(220A+141C)\right)\text{EllipticE}\left[\text{ArcSin}\left[\tan\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\left(1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}-$$

$$2ab\left(15a^3C-6a^2b(320A+191C)+4ab^2(260A+193C)-8b^3(380A+289C)\right)\text{EllipticF}\left[\text{ArcSin}\left[\tan\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\tan\left[\frac{1}{2}(c+dx)\right]^2}\left(1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\tan\left[\frac{1}{2}(c+dx)\right]^2-b\tan\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(1920b^2d\sqrt{1+\tan\left[\frac{1}{2}(c+dx)\right]^2}\left(b\left(-1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)-a\left(1+\tan\left[\frac{1}{2}(c+dx)\right]^2\right)\right)\right)$$

- **Problem 1434: Unable to integrate problem.**

$$\int\frac{\left(A+C\cos[c+dx]^2\right)\sec[c+dx]^{9/2}}{\sqrt{a+b\cos[c+dx]}}\,dx$$

Optimal (type 4, 469 leaves, 7 steps) :

$$-\frac{1}{105\,a^5\,d\,\sqrt{\text{Sec}[c+d\,x]}}4\,(a-b)\,b\,\sqrt{a+b}\,\left(24\,A\,b^2+a^2\,(22\,A+35\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{105\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,\left(12\,a\,A\,b^2-48\,A\,b^3-5\,a^3\,(5\,A+7\,C)-a^2\,(44\,A\,b+70\,b\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,\left(24\,A\,b^2+5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,a^3\,d}-\frac{12\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,a^2\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,a\,d}$$

Result (type 8, 39 leaves):

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

- **Problem 1435: Unable to integrate problem.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 394 leaves, 6 steps):

$$\frac{1}{15\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2+3\,a^2\,(3\,A+5\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{15\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,\left(2\,a\,A\,b-8\,A\,b^2-3\,a^2\,(3\,A+5\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{8\,A\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a^2\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,a\,d}$$

Result (type 8, 39 leaves):

$$\int \frac{\left(A + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^{7/2}}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

- **Problem 1436: Unable to integrate problem.**

$$\int \frac{\left(A + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^{5/2}}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

Optimal (type 4, 323 leaves, 5 steps):

$$-\frac{1}{3 a^3 d \sqrt{\operatorname{Sec}[c + d x]}} 4 A (a - b) b \sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right] \sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}} + \frac{1}{3 a^2 d \sqrt{\operatorname{Sec}[c + d x]}} 2 \sqrt{a + b} (2 A b + a (A + 3 C)) \sqrt{\operatorname{Cos}[c + d x]} \operatorname{Csc}[c + d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a + b \operatorname{Cos}[c + d x]}}{\sqrt{a + b} \sqrt{\operatorname{Cos}[c + d x]}}\right], -\frac{a + b}{a - b}\right] \sqrt{\frac{a (1 - \operatorname{Sec}[c + d x])}{a + b}} \sqrt{\frac{a (1 + \operatorname{Sec}[c + d x])}{a - b}} + \frac{2 A \sqrt{a + b \operatorname{Cos}[c + d x]} \operatorname{Sec}[c + d x]^{3/2} \operatorname{Sin}[c + d x]}{3 a d}$$

Result (type 8, 39 leaves):

$$\int \frac{\left(A + C \operatorname{Cos}[c + d x]^2\right) \operatorname{Sec}[c + d x]^{5/2}}{\sqrt{a + b \operatorname{Cos}[c + d x]}} \, dx$$

- **Problem 1439: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A + C \operatorname{Cos}[c + d x]^2}{\sqrt{a + b \operatorname{Cos}[c + d x]} \sqrt{\operatorname{Sec}[c + d x]}} \, dx$$

Optimal (type 4, 515 leaves, 8 steps):

$$\frac{1}{4 b^2 d \sqrt{\text{Sec}[c+d x]}}$$

$$3 (a-b) \sqrt{a+b}\; C \sqrt{\text{Cos}[c+d x]}\; \text{Csc}[c+d x]\; \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$

$$\frac{1}{4 b^2 d \sqrt{\text{Sec}[c+d x]}} (3 a-2 b) \sqrt{a+b}\; C \sqrt{\text{Cos}[c+d x]}\; \text{Csc}[c+d x]\; \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{1}{4 b^3 d \sqrt{\text{Sec}[c+d x]}} \sqrt{a+b} \left(3 a^2 C+4 b^2 (2 A+C)\right) \sqrt{\text{Cos}[c+d x]}$$

$$\text{Csc}[c+d x]\; \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$

$$\frac{C \sqrt{a+b\,\text{Cos}[c+d x]}\; \text{Sin}[c+d x]}{2 b d \sqrt{\text{Sec}[c+d x]}} - \frac{3 a C \sqrt{a+b\,\text{Cos}[c+d x]}\; \sqrt{\text{Sec}[c+d x]}\; \text{Sin}[c+d x]}{4 b^2 d}$$

Result (type 4, 1399 leaves) :

$$\frac{C \sqrt{a+b\,\text{Cos}[c+d x]}\; \sqrt{\text{Sec}[c+d x]}\; \text{Sin}[2 (c+d x)]}{4 b d} +$$

$$\Bigg(3 a^2 \sqrt{\frac{a-b}{a+b}}\; C\, \text{Tan}\left[\frac{1}{2} (c+d x)\right] + 3 a b \sqrt{\frac{a-b}{a+b}}\; C\, \text{Tan}\left[\frac{1}{2} (c+d x)\right] - 6 a b \sqrt{\frac{a-b}{a+b}}\; C\, \text{Tan}\left[\frac{1}{2} (c+d x)\right]^3 - 3 a^2 \sqrt{\frac{a-b}{a+b}}\; C\, \text{Tan}\left[\frac{1}{2} (c+d x)\right]^5 +$$

$$3 a b \sqrt{\frac{a-b}{a+b}}\; C\, \text{Tan}\left[\frac{1}{2} (c+d x)\right]^5 + 16 \,i\, A b^2\, \text{EllipticPi}\left[\frac{a+b}{a-b}, i\, \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\; \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right], -\frac{a+b}{a-b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}} + 6 \,i\, a^2 C\, \text{EllipticPi}\left[\frac{a+b}{a-b}, i\, \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\; \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right], -\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}\; \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}{a+b}} +$$

$$8 \,i\, b^2 C\, \text{EllipticPi}\left[\frac{a+b}{a-b}, i\, \text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\; \text{Tan}\left[\frac{1}{2} (c+d x)\right]\right], -\frac{a+b}{a-b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2} (c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+16\,i\,A\,b^2\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$6\,i\,a^2\,C\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+8\,i\,b^2\,C\,\mathrm{EllipticPi}\left[\frac{a+b}{a-b},\,i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$3\,i\,a\,(a-b)\,C\,\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$2\,i\,\left(4\,A\,b^2+3\,a^2\,C-a\,b\,C+2\,b^2\,C\right)\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,-\frac{a+b}{a-b}\right]$$

$$\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\Bigg/$$

$$\left(4\,b^2\sqrt{\frac{a-b}{a+b}}\,d\,\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4\right)\right)$$

- **Problem 1440: Attempted integration timed out after 120 seconds.**

$$\int\frac{\left(A+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{7/2}}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 534 leaves, 7 steps) :

$$-\left(2\left(16\,A\,b^4-2\,a^2\,b^2\,(4\,A-5\,C)-a^4\,(3\,A+5\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Bigg/\left(5\,a^5\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)-$$

$$\left(2\left(12\,a\,A\,b^2+16\,A\,b^3+2\,a^2\,b\,(2\,A+5\,C)+a^3\,(3\,A+5\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Bigg/\left(5\,a^4\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\frac{2\,b\left(8\,A\,b^2-a^2\,(3\,A-5\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{5\,a^3\left(a^2-b^2\right)d}+\frac{2\left(A\,b^2+a^2\,C\right)\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{2\left(6\,A\,b^2-a^2\,(A-5\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,a^2\left(a^2-b^2\right)d}$$

Result (type 1, 1 leaves) :

???

## Problem 1441: Unable to integrate problem.

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 432 leaves, 6 steps) :

$$\left(2\,b\,\left(8\,A\,b^2-a^2\,(5\,A-3\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\bigg/\left(3\,a^4\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\left(2\,\left(6\,a\,A\,b+8\,A\,b^2+a^2\,(A+3\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\bigg/\left(3\,a^3\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\frac{2\,\left(A\,b^2+a^2\,C\right)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{2\,\left(4\,A\,b^2-a^2\,(A-3\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)\,d}$$

Result (type 8, 39 leaves):

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

## Problem 1442: Unable to integrate problem.

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 348 leaves, 5 steps):

$$-\left(2\left(2\,A\,b^2-a^2\,(A-C)\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a^3\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)-\left(2\,(2\,A\,b+a\,(A-C))\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a^2\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+\frac{2\left(A\,b^2+a^2\,C\right)\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{a\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 39 leaves) :

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

- **Problem 1443: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 481 leaves, 7 steps) :

$$\left(2\left(A b^2+a^2 C\right)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/$$
$$\left(a^2 b\sqrt{a+b}\,d\sqrt{\text{Sec}[c+d x]}\right)+$$
$$\left(2\,(A b-a C)\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right)\Big/$$
$$\left(a b\sqrt{a+b}\,d\sqrt{\text{Sec}[c+d x]}\right)-\frac{1}{b^2 d\sqrt{\text{Sec}[c+d x]}}$$
$$2\sqrt{a+b}\,C\sqrt{\text{Cos}[c+d x]}\,\text{Csc}[c+d x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{2\left(A b^2+a^2 C\right)\sqrt{\text{Sec}[c+d x]}\,\text{Sin}[c+d x]}{b\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 4, 1027 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d x]}\,\sqrt{\text{Sec}[c+d x]}\left(\frac{2\left(A b^2+a^2 C\right)\text{Sin}[c+d x]}{a b\left(a^2-b^2\right)}+\frac{2\left(A b^2\,\text{Sin}[c+d x]+a^2 C\,\text{Sin}[c+d x]\right)}{b\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d x])}\right)}{d}-$$
$$\left(2\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(a A b^2\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]+A b^3\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]+a^3 C\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]+a^2 b C\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]-\right.\right.$$
$$2 A b^3\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^3-2 a^2 b C\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^3-a A b^2\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^5+A b^3\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^5-a^3 C\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^5+$$
$$a^2 b C\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^5+2 a^3 C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$
$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-2 a b^2 C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$
$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+2 a^3 C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-2\,a\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$(a+b)\left(A\,b^2+a^2\,C\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-a\,b\,(a+b)\,(A+C)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)\right)\Bigg/$$

$$\left(b\left(a^3-a\,b^2\right)d\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)$$

- **Problem 1444: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\text{Cos}[c+d x]^2}{(a+b\,\text{Cos}[c+d x])^{3/2}\sqrt{\text{Sec}[c+d x]}}\,dx$$

Optimal (type 4, 563 leaves, 8 steps) :

$$-\left(\left(2\,A\,b^2+3\,a^2\,C-b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a\,b^2\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\left(\left(2\,A\,b^2+a\,(3\,a+b)\,C\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a\,b^2\,\sqrt{a+b}\;d\,\sqrt{\text{Sec}[c+d\,x]}\right)+\frac{1}{b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$3\,a\,\sqrt{a+b}\;C\,\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]\;\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\;\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\;\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{2\left(A\,b^2+a^2\,C\right)\text{Sin}[c+d\,x]}{b\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{\left(2\,A\,b^2+3\,a^2\,C-b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{b^2\left(a^2-b^2\right)d}$$

Result (type 4, 1163 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}\left(\frac{2\left(A\,b^2+a^2\,C\right)\text{Sin}[c+d\,x]}{b^2\left(-a^2+b^2\right)}-\frac{2\left(a\,A\,b^2\,\text{Sin}[c+d\,x]+a^3\,C\,\text{Sin}[c+d\,x]\right)}{b^2\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d\,x])}\right)}{d}+$$

$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right.$$

$$\left(2\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+3\,a^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+3\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-a\,b^2\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-\right.$$

$$b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-4\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-6\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-2\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-3\,a^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+3\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+a\,b^2\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$6\,a^3\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-$$

$$6\,a\,b^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+$$

$$6\,a^3\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-6\,a\,b^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,+$$

$$(a+b)\,\left(2\,A\,b^2+3\,a^2\,C-b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-2\,b\,(a+b)\,(A\,b+a\,C)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\Bigg/$$

$$\left(b^2\,\left(-a^2+b^2\right)\,d\,\sqrt{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(b\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)-a\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 1445: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 664 leaves, 9 steps) :

$$\left(\left(8 A b^2+15 a^2 C-7 b^2 C\right) \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]\, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(4 b^3 \sqrt{a+b}\, d \sqrt{\text{Sec}[c+d x]}\right)-$$

$$\left(\left(8 A b^2+\left(15 a^2+5 a b-2 b^2\right) C\right) \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(4 b^3 \sqrt{a+b}\, d \sqrt{\text{Sec}[c+d x]}\right)-\frac{1}{4 b^4 d \sqrt{\text{Sec}[c+d x]}}$$

$$\sqrt{a+b}\,\left(8 A b^2+15 a^2 C+4 b^2 C\right) \sqrt{\text{Cos}[c+d x]}\, \text{Csc}[c+d x]\, \text{EllipticPi}\left[\frac{a+b}{b}, \text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a\,(1+\text{Sec}[c+d x])}{a-b}}-\frac{2\left(A b^2+a^2 C\right) \text{Sin}[c+d x]}{b\left(a^2-b^2\right) d \sqrt{a+b\,\text{Cos}[c+d x]}\, \text{Sec}[c+d x]^{3/2}}+$$

$$\frac{\left(4 A b^2+5 a^2 C-b^2 C\right) \sqrt{a+b\,\text{Cos}[c+d x]}\, \text{Sin}[c+d x]}{2 b^2\left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}}-\frac{a\left(8 A b^2+15 a^2 C-7 b^2 C\right) \sqrt{a+b\,\text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}\, \text{Sin}[c+d x]}{4 b^3\left(a^2-b^2\right) d}$$

Result (type 4, 40 202 leaves) : Display of huge result suppressed!

- **Problem 1446: Attempted integration timed out after 120 seconds.**

$$\int \frac{\left(A+C\,\text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^{5/2}}{(a+b\,\text{Cos}[c+d x])^{5/2}}\, dx$$

Optimal (type 4, 589 leaves, 7 steps) :

$$-\left(4\,b\,\left(8\,A\,b^4+a^4\,(4\,A-3\,C)-a^2\,b^2\,(14\,A-C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^5\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-$$

$$\left(2\,\left(12\,a\,A\,b^3+16\,A\,b^4-2\,a^2\,b^2\,(8\,A-C)-a^4\,(A+3\,C)-a^3\,(9\,A\,b-3\,b\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^4\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+\frac{2\,\left(A\,b^2+a^2\,C\right)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}+$$

$$\frac{4\,\left(5\,a^2\,A\,b^2-3\,A\,b^4+2\,a^4\,C\right)\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{2\,\left(8\,A\,b^4+a^4\,(A-5\,C)-a^2\,b^2\,(13\,A-C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,a^3\,\left(a^2-b^2\right)^2\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1447: Attempted integration timed out after 120 seconds.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{3/2}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 489 leaves, 6 steps) :

$$\left(2\left(8\,A\,b^4+3\,a^4\,(A-C)-a^2\,b^2\,(15\,A+C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^4\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\left(2\left(6\,a\,A\,b^2+8\,A\,b^3-3\,a^3\,(A-C)-a^2\,b\,(9\,A+C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^3\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\frac{2\left(A\,b^2+a^2\,C\right)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}}-\frac{4\left(2\,A\,b^4-a^4\,C-a^2\,b^2\,(4\,A+C)\right)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a^2\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 1, 1 leaves) :

???

- **Problem 1448: Unable to integrate problem.**

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 456 leaves, 6 steps) :

$$-\left(4\,b\,\left(A\,b^2-a^2\,(3\,A+2\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^3\,(a-b)\,(a+b)^{3/2}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-$$

$$\left(2\,\left(2\,A\,b^2+3\,a\,b\,(A+C)-a^2\,(3\,A+C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(3\,a^2\,\sqrt{a+b}\,\left(a^2-b^2\right)\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\frac{2\,\left(A\,b^2+a^2\,C\right)\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{4\,b\,\left(A\,b^2-a^2\,(3\,A+2\,C)\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{3\,a\,\left(a^2-b^2\right)^2\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 8, 39 leaves) :

$$\int\frac{\left(A+C\,\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

## Problem 1449: Result more than twice size of optimal antiderivative.

$$\int\frac{A+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 618 leaves, 8 steps) :

$$-\left(2\left(A b^4-3 a^4 C+a^2 b^2 (3 A+7 C)\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3 a^2 b^2 \sqrt{a+b}\left(a^2-b^2\right) d \sqrt{\operatorname{Sec}[c+d x]}\right)-$$

$$\left(2\left(A b^3+3 a^3 C+a^2 b C-3 a b^2 (A+2 C)\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3 a(a-b) b^2(a+b)^{3/2} d \sqrt{\operatorname{Sec}[c+d x]}\right)-$$

$$\frac{1}{b^3 d \sqrt{\operatorname{Sec}[c+d x]}} 2 \sqrt{a+b}\, C \sqrt{\operatorname{Cos}[c+d x]} \operatorname{Csc}[c+d x] \operatorname{EllipticPi}\left[\frac{a+b}{b}, \operatorname{ArcSin}\left[\frac{\sqrt{a+b \operatorname{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}} \sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}-$$

$$\frac{2\left(A b^2+a^2 C\right) \operatorname{Sin}[c+d x]}{3 b\left(a^2-b^2\right) d(a+b \operatorname{Cos}[c+d x])^{3/2} \sqrt{\operatorname{Sec}[c+d x]}}+\frac{2\left(A b^4-3 a^4 C+a^2 b^2 (3 A+7 C)\right) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{3 b^2\left(a^2-b^2\right)^2 d \sqrt{a+b \operatorname{Cos}[c+d x]}}$$

Result (type 4, 1588 leaves):

$$\frac{1}{d} \sqrt{a+b \operatorname{Cos}[c+d x]} \sqrt{\operatorname{Sec}[c+d x]}\left(\frac{2\left(-3 a^2 A b^2-A b^4+3 a^4 C-7 a^2 b^2 C\right) \operatorname{Sin}[c+d x]}{3 a b^2\left(a^2-b^2\right)^2}-\right.$$

$$\left.\frac{2\left(a A b^2 \operatorname{Sin}[c+d x]+a^3 C \operatorname{Sin}[c+d x]\right)}{3 b^2\left(-a^2+b^2\right)(a+b \operatorname{Cos}[c+d x])^2}+\frac{4\left(a^2 A b^2 \operatorname{Sin}[c+d x]+A b^4 \operatorname{Sin}[c+d x]-2 a^4 C \operatorname{Sin}[c+d x]+4 a^2 b^2 C \operatorname{Sin}[c+d x]\right)}{3 b^2\left(-a^2+b^2\right)^2(a+b \operatorname{Cos}[c+d x])}\right)+$$

$$\left(2 \sqrt{\frac{1}{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(3 a^3 A b^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+3 a^2 A b^3 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+a A b^4 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+A b^5 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-\right.\right.$$

$$3 a^5 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-3 a^4 b C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+7 a^3 b^2 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+7 a^2 b^3 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-$$

$$6 a^2 A b^3 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3-2 A b^5 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3+6 a^4 b C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3-14 a^2 b^3 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3-$$

$$3 a^3 A b^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+3 a^2 A b^3 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-a A b^4 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+A b^5 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+$$

$$3 a^5 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-3 a^4 b C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-7 a^3 b^2 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+7 a^2 b^3 C \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-$$

$$6 a^5 C \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$12 a^3 b^2 C \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$6 a b^4 C \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$6 a^5 C \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+12 a^3 b^2 C \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$6 a b^4 C \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-(a+b)\left(-A b^4+3 a^4 C-a^2 b^2(3 A+7 C)\right) \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$a b(a+b)\left(2 a^2 C-3 a b(A+C)-b^2(A+3 C)\right) \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\Bigg)\Bigg)\Big/$$

$$\left(3\,a\,b^2\,(a^2-b^2)^2\,d\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)$$

- **Problem 1450: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+C\,\mathrm{Cos}[c+d\,x]^2}{(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 710 leaves, 9 steps) :

$$\Bigg(\left(8\,A\,b^4-\left(15\,a^4-26\,a^2\,b^2+3\,b^4\right)C\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\Bigg)\Big/\left(3\,a\,(a-b)\,b^3\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}\right)-$$

$$\Bigg(\left(6\,A\,b^4-a\,b^3\,(2\,A-3\,C)-15\,a^4\,C-5\,a^3\,b\,C+21\,a^2\,b^2\,C\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\Bigg)\Big/\left(3\,a\,(a-b)\,b^3\,(a+b)^{3/2}\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}\right)+$$

$$\frac{1}{b^4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}5\,a\,\sqrt{a+b}\,C\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{2\left(A\,b^2+a^2\,C\right)\mathrm{Sin}[c+d\,x]}{3\,b\left(a^2-b^2\right)d\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{3/2}}+$$

$$\frac{2\left(3\,A\,b^4-5\,a^4\,C+a^2\,b^2\,(A+9\,C)\right)\mathrm{Sin}[c+d\,x]}{3\,b^2\left(a^2-b^2\right)^2d\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}}-\frac{\left(8\,A\,b^4-\left(15\,a^4-26\,a^2\,b^2+3\,b^4\right)C\right)\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,b^3\left(a^2-b^2\right)^2d}$$

Result (type 4, 1609 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(-\frac{4\left(-2\,A\,b^4+3\,a^4\,C-5\,a^2\,b^2\,C\right)\text{Sin}[c+d\,x]}{3\,b^3\left(a^2-b^2\right)^2}+\right.$$

$$\left.\frac{2\left(a^2\,A\,b^2\,\text{Sin}[c+d\,x]+a^4\,C\,\text{Sin}[c+d\,x]\right)}{3\,b^3\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d\,x])^2}+\frac{2\left(a^3\,A\,b^2\,\text{Sin}[c+d\,x]-5\,a\,A\,b^4\,\text{Sin}[c+d\,x]+7\,a^5\,C\,\text{Sin}[c+d\,x]-11\,a^3\,b^2\,C\,\text{Sin}[c+d\,x]\right)}{3\,b^3\left(-a^2+b^2\right)^2(a+b\,\text{Cos}[c+d\,x])}\right)+$$

$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right.$$

$$\left(8\,a\,A\,b^4\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+8\,A\,b^5\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-15\,a^5\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-15\,a^4\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+26\,a^3\,b^2\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.$$

$$26\,a^2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-3\,a\,b^4\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-3\,b^5\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-16\,A\,b^5\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+30\,a^4\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-$$

$$52\,a^2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+6\,b^5\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-8\,a\,A\,b^4\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+8\,A\,b^5\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+15\,a^5\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-$$

$$15\,a^4\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-26\,a^3\,b^2\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+26\,a^2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+3\,a\,b^4\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-3\,b^5\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-$$

$$30\,a^5\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$60\,a^3\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$30\,a\,b^4\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$30\,a^5\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+60\,a^3\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\;\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\;-30\,a\,b^4\,C\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\;\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\;-$$

$$(a+b)\left(-8\,A\,b^4+\left(15\,a^4-26\,a^2\,b^2+3\,b^4\right)C\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\;-$$

$$2\,b\,(a+b)\left(3\,A\,b^3-5\,a^3\,C+3\,a^2\,b\,C+a\,b^2\,(A+6\,C)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(3\,b^3\left(a^2-b^2\right)^2 d\,\sqrt{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(b\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-a\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 1482: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{7/2}}{a+b\,\mathrm{Cos}[c+d\,x]}\,dx$$

Optimal (type 4, 294 leaves, 9 steps):

$$-\frac{2\left(5\,A\,b^2-5\,a\,b\,B+a^2\,(3\,A+5\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticE}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{5\,a^3\,d}-$$

$$\frac{2\,(A\,b-a\,B)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticF}\left[\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,a^2\,d}-$$

$$\frac{2\,b\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}(c+d\,x),2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{a^3\,(a+b)\,d}+$$

$$\frac{2\left(5\,A\,b^2-5\,a\,b\,B+a^2\,(3\,A+5\,C)\right)\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{5\,a^3\,d}-\frac{2\,(A\,b-a\,B)\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a^2\,d}+\frac{2\,A\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,a\,d}$$

Result (type 4, 698 leaves):

$$-\frac{1}{30 a^3 d}\Bigg(-\Big(2\left(18 a^3 A+40 a A b^2-40 a^2 b B+30 a^3 C\right) \operatorname{Cos}[c+d x]^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] (b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2} \operatorname{Sin}[c+d x]\Big)\Big/\left(b (a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right)\right)+\Big(2\left(19 a^2 A b+45 A b^3-10 a^3 B-45 a b^2 B+45 a^2 b C\right) \operatorname{Cos}[c+d x]^2\Big(\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]+\operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right]\Big) (b+a \operatorname{Sec}[c+d x]) \sqrt{1-\operatorname{Sec}[c+d x]^2} \operatorname{Sin}[c+d x]\Big)\Big/\left(a (a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right)\right)+\Big(\left(9 a^2 A b+15 A b^3-15 a b^2 B+15 a^2 b C\right) \operatorname{Cos}[2 (c+d x)] (b+a \operatorname{Sec}[c+d x])\Big(-4 a b+4 a b \operatorname{Sec}[c+d x]^2-4 a b \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+2 (2 a-b) b \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}+4 a^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}-2 b^2 \operatorname{EllipticPi}\left[-\frac{a}{b},-\operatorname{ArcSin}\left[\sqrt{\operatorname{Sec}[c+d x]}\right],-1\right] \sqrt{\operatorname{Sec}[c+d x]} \sqrt{1-\operatorname{Sec}[c+d x]^2}\Big) \operatorname{Sin}[c+d x]\Big)\Big/\left(a b^2 (a+b \operatorname{Cos}[c+d x])\left(1-\operatorname{Cos}[c+d x]^2\right) \sqrt{\operatorname{Sec}[c+d x]}\left(2-\operatorname{Sec}[c+d x]^2\right)\right)\Bigg)+$$

$$\frac{\sqrt{\operatorname{Sec}[c+d x]}\left(\frac{2\left(3 a^2 A+5 A b^2-5 a b B+5 a^2 C\right) \operatorname{Sin}[c+d x]}{5 a^3}+\frac{2 \operatorname{Sec}[c+d x](-A b \operatorname{Sin}[c+d x]+a B \operatorname{Sin}[c+d x])}{3 a^2}+\frac{2 A \operatorname{Sec}[c+d x] \operatorname{Tan}[c+d x]}{5 a}\right)}{d}$$

## Problem 1483: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B \operatorname{Cos}[c+d x]+C \operatorname{Cos}[c+d x]^2\right) \operatorname{Sec}[c+d x]^{5/2}}{a+b \operatorname{Cos}[c+d x]} \, dx$$

Optimal (type 4, 218 leaves, 8 steps):

$$\frac{2 (A b-a B) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a^2 d}+\frac{2 A \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{3 a d}+\frac{2\left(A b^2-a (b B-a C)\right) \sqrt{\operatorname{Cos}[c+d x]} \operatorname{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2} (c+d x), 2\right] \sqrt{\operatorname{Sec}[c+d x]}}{a^2 (a+b) d}-\frac{2 (A b-a B) \sqrt{\operatorname{Sec}[c+d x]} \operatorname{Sin}[c+d x]}{a^2 d}+\frac{2 A \operatorname{Sec}[c+d x]^{3/2} \operatorname{Sin}[c+d x]}{3 a d}$$

Result (type 4, 600 leaves):

$$\frac{1}{6\,a^2\,d}\left(-\left(2\,(8\,a\,A\,b-6\,a^2\,B)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,-\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]\,(b+a\,\mathrm{Sec}[c+d\,x])\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}\,\mathrm{Sin}[c+d\,x]\right)\Big/\left(b\,(a+b\,\mathrm{Cos}[c+d\,x])\,(1-\mathrm{Cos}[c+d\,x]^2)\right)+\left(2\,(2\,a^2\,A+9\,A\,b^2-9\,a\,b\,B+6\,a^2\,C)\,\mathrm{Cos}[c+d\,x]^2\left(\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]+\mathrm{EllipticPi}\left[-\frac{a}{b},\,-\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]\right)(b+a\,\mathrm{Sec}[c+d\,x])\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}\,\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,(a+b\,\mathrm{Cos}[c+d\,x])\,(1-\mathrm{Cos}[c+d\,x]^2)\right)+\left((3\,A\,b^2-3\,a\,b\,B)\,\mathrm{Cos}[2\,(c+d\,x)]\,(b+a\,\mathrm{Sec}[c+d\,x])\left(-4\,a\,b+4\,a\,b\,\mathrm{Sec}[c+d\,x]^2-4\,a\,b\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}+4\,a^2\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,-\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}-2\,b^2\,\mathrm{EllipticPi}\left[-\frac{a}{b},\,-\mathrm{ArcSin}\left[\sqrt{\mathrm{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}\right)\mathrm{Sin}[c+d\,x]\right)\Big/\left(a\,b^2\,(a+b\,\mathrm{Cos}[c+d\,x])\,(1-\mathrm{Cos}[c+d\,x]^2)\,\sqrt{\mathrm{Sec}[c+d\,x]}\,(2-\mathrm{Sec}[c+d\,x]^2)\right)\right)+\frac{\sqrt{\mathrm{Sec}[c+d\,x]}\left(\frac{2\,(-A\,b+a\,B)\,\mathrm{Sin}[c+d\,x]}{a^2}+\frac{2\,A\,\mathrm{Tan}[c+d\,x]}{3\,a}\right)}{d}$$

- **Problem 1486: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{(a+b\,\mathrm{Cos}[c+d\,x])\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 207 leaves, 7 steps):

$$\frac{2\,(b\,B-a\,C)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{b^2\,d}+\frac{2\,\left(b^2\,(3\,A+C)-3\,a\,(b\,B-a\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,b^3\,d}-\frac{2\,a\,\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\mathrm{Sec}[c+d\,x]}}{b^3\,(a+b)\,d}+\frac{2\,C\,\mathrm{Sin}[c+d\,x]}{3\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

Result (type 4, 560 leaves):

$$\frac{1}{6\,b\,d}\Bigg(-\Bigg(2\,(6\,A\,b+2\,b\,C)\,\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Big/$$
$$\left(b\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$
$$\Bigg(2\,(3\,b\,B-a\,C)\,\text{Cos}[c+d\,x]^2\,\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\Big)$$
$$(b+a\,\text{Sec}[c+d\,x])\,\sqrt{1-\text{Sec}[c+d\,x]^2}\,\text{Sin}[c+d\,x]\Bigg)\Big/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$
$$\Bigg((3\,b\,B-3\,a\,C)\,\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Bigg(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]$$
$$\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}+$$
$$4\,a^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\text{EllipticPi}\Big[-\frac{a}{b},-\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\,x]}\Big],-1\Big]\,\sqrt{\text{Sec}[c+d\,x]}\,\sqrt{1-\text{Sec}[c+d\,x]^2}\Bigg)\,\text{Sin}[c+d\,x]\Bigg)\Big/$$
$$\left(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\,\sqrt{\text{Sec}[c+d\,x]}\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\Bigg)+\frac{C\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{3\,b\,d}$$

- **Problem 1487: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 270 leaves, 8 steps):

$$\frac{2\left(5\,A\,b^2-5\,a\,b\,B+5\,a^2\,C+3\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{5\,b^3\,d}+$$
$$\frac{2\left(3\,a^2\,b\,B+b^3\,B-3\,a^3\,C-a\,b^2\,(3\,A+C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{3\,b^4\,d}+$$
$$\frac{2\,a^2\,\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{EllipticPi}\left[\frac{2\,b}{a+b},\frac{1}{2}\,(c+d\,x),2\right]\sqrt{\text{Sec}[c+d\,x]}}{b^4\,(a+b)\,d}+\frac{2\,C\,\text{Sin}[c+d\,x]}{5\,b\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{2\,(b\,B-a\,C)\,\text{Sin}[c+d\,x]}{3\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 632 leaves):

$$-\frac{1}{30\, b^2\, d}\Bigg(-\Bigg(2\,(-10\, b^2\, B-8\, a\, b\, C)\, \text{Cos}[c+d\, x]^2\, \text{EllipticPi}\Big[-\frac{a}{b},\, -\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]\,(b+a\, \text{Sec}[c+d\, x])\,\sqrt{1-\text{Sec}[c+d\, x]^2}\, \text{Sin}[c+d\, x]\Bigg)\Big/$$

$$(b\,(a+b\, \text{Cos}[c+d\, x])\,(1-\text{Cos}[c+d\, x]^2))+\Bigg(2\,(-15\, A\, b^2+5\, a\, b\, B-5\, a^2\, C-9\, b^2\, C)\, \text{Cos}[c+d\, x]^2$$

$$\Big(\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]+\text{EllipticPi}\Big[-\frac{a}{b},\, -\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]\Big)$$

$$(b+a\, \text{Sec}[c+d\, x])\,\sqrt{1-\text{Sec}[c+d\, x]^2}\, \text{Sin}[c+d\, x]\Bigg)\Big/\,(a\,(a+b\, \text{Cos}[c+d\, x])\,(1-\text{Cos}[c+d\, x]^2))+$$

$$\Bigg(\Big((-15\, A\, b^2+15\, a\, b\, B-15\, a^2\, C-9\, b^2\, C)\, \text{Cos}[2\,(c+d\, x)]\,(b+a\, \text{Sec}[c+d\, x])\,\Big(-4\, a\, b+4\, a\, b\, \text{Sec}[c+d\, x]^2-$$

$$4\, a\, b\, \text{EllipticE}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]\,\sqrt{\text{Sec}[c+d\, x]}\,\sqrt{1-\text{Sec}[c+d\, x]^2}+2\,(2\, a-b)\, b\, \text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]$$

$$\sqrt{\text{Sec}[c+d\, x]}\,\sqrt{1-\text{Sec}[c+d\, x]^2}+4\, a^2\, \text{EllipticPi}\Big[-\frac{a}{b},\, -\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]\,\sqrt{\text{Sec}[c+d\, x]}\,\sqrt{1-\text{Sec}[c+d\, x]^2}-$$

$$2\, b^2\, \text{EllipticPi}\Big[-\frac{a}{b},\, -\text{ArcSin}\Big[\sqrt{\text{Sec}[c+d\, x]}\Big],\, -1\Big]\,\sqrt{\text{Sec}[c+d\, x]}\,\sqrt{1-\text{Sec}[c+d\, x]^2}\Big)\, \text{Sin}[c+d\, x]\Big)\Big/$$

$$\Big(a\, b^2\,(a+b\, \text{Cos}[c+d\, x])\,(1-\text{Cos}[c+d\, x]^2)\,\sqrt{\text{Sec}[c+d\, x]}\,(2-\text{Sec}[c+d\, x]^2)\Big)\Bigg)\Bigg)+$$

$$\frac{\sqrt{\text{Sec}[c+d\, x]}\,\left(\frac{C\, \text{Sin}[c+d\, x]}{10\, b}+\frac{(b\, B-a\, C)\, \text{Sin}[2\,(c+d\, x)]}{3\, b^2}+\frac{C\, \text{Sin}[3\,(c+d\, x)]}{10\, b}\right)}{d}$$

- **Problem 1488: Result more than twice size of optimal antiderivative.**

$$\int \frac{A+B\, \text{Cos}[c+d\, x]+C\, \text{Cos}[c+d\, x]^2}{(a+b\, \text{Cos}[c+d\, x])\, \text{Sec}[c+d\, x]^{5/2}}\, dx$$

Optimal (type 4, 345 leaves, 9 steps):

$$\frac{2\,(5\, a^2\, b\, B+3\, b^3\, B-5\, a^3\, C-a\, b^2\,(5\, A+3\, C))\,\sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticE}\Big[\frac{1}{2}\,(c+d\, x),\, 2\Big]\,\sqrt{\text{Sec}[c+d\, x]}}{5\, b^4\, d}-\frac{1}{21\, b^5\, d}$$

$$2\,(21\, a^3\, b\, B+7\, a\, b^3\, B-21\, a^4\, C-7\, a^2\, b^2\,(3\, A+C)-b^4\,(7\, A+5\, C))\,\sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticF}\Big[\frac{1}{2}\,(c+d\, x),\, 2\Big]\,\sqrt{\text{Sec}[c+d\, x]}-$$

$$\frac{2\, a^3\,(A\, b^2-a\,(b\, B-a\, C))\,\sqrt{\text{Cos}[c+d\, x]}\, \text{EllipticPi}\Big[\frac{2\, b}{a+b},\, \frac{1}{2}\,(c+d\, x),\, 2\Big]\,\sqrt{\text{Sec}[c+d\, x]}}{b^5\,(a+b)\, d}+$$

$$\frac{2\, C\, \text{Sin}[c+d\, x]}{7\, b\, d\, \text{Sec}[c+d\, x]^{5/2}}+\frac{2\,(b\, B-a\, C)\, \text{Sin}[c+d\, x]}{5\, b^2\, d\, \text{Sec}[c+d\, x]^{3/2}}+\frac{2\,(7\, A\, b^2-7\, a\, b\, B+7\, a^2\, C+5\, b^2\, C)\, \text{Sin}[c+d\, x]}{21\, b^3\, d\,\sqrt{\text{Sec}[c+d\, x]}}$$

Result (type 4, 713 leaves):

$$-\frac{1}{210\,b^3\,d}\Bigg(-\bigg(2\,(-70\,A\,b^3-56\,a\,b^2\,B+56\,a^2\,b\,C-50\,b^3\,C)\,\mathrm{Cos}[c+d\,x]^2\,\mathrm{EllipticPi}\Big[-\frac{a}{b},\,-\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]$$
$$(b+a\,\mathrm{Sec}[c+d\,x])\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}\,\mathrm{Sin}[c+d\,x]\bigg)\Big/\left(b\,(a+b\,\mathrm{Cos}[c+d\,x])\,\left(1-\mathrm{Cos}[c+d\,x]^2\right)\right)+$$
$$\bigg(2\,(35\,a\,A\,b^2-35\,a^2\,b\,B-63\,b^3\,B+35\,a^3\,C+13\,a\,b^2\,C)\,\mathrm{Cos}[c+d\,x]^2\,\Big(\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]+\mathrm{EllipticPi}\Big[-\frac{a}{b},$$
$$-\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]\Big)\,(b+a\,\mathrm{Sec}[c+d\,x])\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}\,\mathrm{Sin}[c+d\,x]\bigg)\Big/\left(a\,(a+b\,\mathrm{Cos}[c+d\,x])\,\left(1-\mathrm{Cos}[c+d\,x]^2\right)\right)+$$
$$\bigg(\left(105\,a\,A\,b^2-105\,a^2\,b\,B-63\,b^3\,B+105\,a^3\,C+63\,a\,b^2\,C\right)\,\mathrm{Cos}[2\,(c+d\,x)]\,(b+a\,\mathrm{Sec}[c+d\,x])\,\Big(-4\,a\,b+4\,a\,b\,\mathrm{Sec}[c+d\,x]^2-$$
$$4\,a\,b\,\mathrm{EllipticE}\Big[\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\mathrm{EllipticF}\Big[\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]$$
$$\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}+4\,a^2\,\mathrm{EllipticPi}\Big[-\frac{a}{b},\,-\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}-$$
$$2\,b^2\,\mathrm{EllipticPi}\Big[-\frac{a}{b},\,-\mathrm{ArcSin}\Big[\sqrt{\mathrm{Sec}[c+d\,x]}\Big],\,-1\Big]\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\sqrt{1-\mathrm{Sec}[c+d\,x]^2}\Big)\,\mathrm{Sin}[c+d\,x]\bigg)\Big/$$
$$\left(a\,b^2\,(a+b\,\mathrm{Cos}[c+d\,x])\,\left(1-\mathrm{Cos}[c+d\,x]^2\right)\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(2-\mathrm{Sec}[c+d\,x]^2\right)\right)\Bigg)+\frac{1}{d}$$
$$\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(\frac{(b\,B-a\,C)\,\mathrm{Sin}[c+d\,x]}{10\,b^2}+\frac{\left(14\,A\,b^2-14\,a\,b\,B+14\,a^2\,C+13\,b^2\,C\right)\,\mathrm{Sin}[2\,(c+d\,x)]}{42\,b^3}+\right.$$
$$\frac{(b\,B-a\,C)\,\mathrm{Sin}[3\,(c+d\,x)]}{10\,b^2}+$$
$$\left.\frac{C\,\mathrm{Sin}[4\,(c+d\,x)]}{28\,b}\right)$$

- **Problem 1491: Result more than twice size of optimal antiderivative.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\sqrt{\mathrm{Sec}[c+d\,x]}}{(a+b\,\mathrm{Cos}[c+d\,x])^2}\,dx$$

Optimal (type 4, 303 leaves, 7 steps) :

$$-\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticE}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{a\,b\,\left(a^2-b^2\right)\,d}-$$

$$\frac{\left(A\,b^2-a\,b\,B-a^2\,C+2\,b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticF}\left[\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}}{b^2\,\left(a^2-b^2\right)\,d}-\frac{1}{a\,(a-b)\,b^2\,(a+b)^2\,d}$$

$$\left(A\,b^4+a^3\,b\,B+a\,b^3\,B+a^4\,C-3\,a^2\,b^2\,(A+C)\right)\sqrt{\text{Cos}[c+d\,x]}\ \text{EllipticPi}\left[\frac{2\,b}{a+b},\,\frac{1}{2}\,(c+d\,x),\,2\right]\sqrt{\text{Sec}[c+d\,x]}+$$

$$\frac{\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,(a+b\,\text{Cos}[c+d\,x])\sqrt{\text{Sec}[c+d\,x]}}$$

Result (type 4, 688 leaves) :

$$\frac{1}{4\,a\,(-a+b)\,(a+b)\,d}$$

$$\Bigg(-\Bigg(2\,\left(4\,a\,A\,b-4\,a^2\,B+4\,a\,b\,C\right)\text{Cos}[c+d\,x]^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\,(b+a\,\text{Sec}[c+d\,x])\sqrt{1-\text{Sec}[c+d\,x]^2}$$

$$\text{Sin}[c+d\,x]\Bigg)\Big/\left(b\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$

$$\Bigg(2\,\left(-4\,a^2\,A+3\,A\,b^2+a\,b\,B-a^2\,C\right)\text{Cos}[c+d\,x]^2\,\left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]+\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\right)$$

$$(b+a\,\text{Sec}[c+d\,x])\sqrt{1-\text{Sec}[c+d\,x]^2}\ \text{Sin}[c+d\,x]\Bigg)\Big/\left(a\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\right)+$$

$$\Bigg(\left(A\,b^2-a\,b\,B+a^2\,C\right)\text{Cos}[2\,(c+d\,x)]\,(b+a\,\text{Sec}[c+d\,x])\,\Bigg(-4\,a\,b+4\,a\,b\,\text{Sec}[c+d\,x]^2-4\,a\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]$$

$$\sqrt{\text{Sec}[c+d\,x]}\sqrt{1-\text{Sec}[c+d\,x]^2}+2\,(2\,a-b)\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\sqrt{1-\text{Sec}[c+d\,x]^2}+$$

$$4\,a^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\sqrt{1-\text{Sec}[c+d\,x]^2}-$$

$$2\,b^2\,\text{EllipticPi}\left[-\frac{a}{b},\,-\text{ArcSin}\left[\sqrt{\text{Sec}[c+d\,x]}\right],\,-1\right]\sqrt{\text{Sec}[c+d\,x]}\sqrt{1-\text{Sec}[c+d\,x]^2}\Bigg)\text{Sin}[c+d\,x]\Bigg)\Big/$$

$$\left(a\,b^2\,(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}\,\left(2-\text{Sec}[c+d\,x]^2\right)\right)\Bigg)+$$

$$\frac{\sqrt{\text{Sec}[c+d\,x]}\left(\frac{\left(A\,b^2-a\,b\,B+a^2\,C\right)\text{Sin}[c+d\,x]}{a\,b\,\left(a^2-b^2\right)}+\frac{A\,b^2\,\text{Sin}[c+d\,x]-a\,b\,B\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]}{b\,\left(-a^2+b^2\right)\,(a+b\,\text{Cos}[c+d\,x])}\right)}{d}$$

## ■ Problem 1492: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^2\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 311 leaves, 7 steps) :

$$\frac{\left(A b^2-a b B+3 a^2 C-2 b^2 C\right) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticE}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{b^2 \left(a^2-b^2\right) d}+$$

$$\frac{\left(a^2 b B-2 b^3 B-3 a^3 C+a b^2 (A+4 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticF}\left[\frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}}{b^3 \left(a^2-b^2\right) d}-\frac{1}{(a-b) b^3 (a+b)^2 d}$$

$$\left(A b^4+a^3 b B-3 a b^3 B-3 a^4 C+a^2 b^2 (A+5 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{EllipticPi}\left[\frac{2 b}{a+b}, \frac{1}{2} (c+d x), 2\right] \sqrt{\text{Sec}[c+d x]}-$$

$$\frac{\left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{b \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x]) \sqrt{\text{Sec}[c+d x]}}$$

Result (type 4, 695 leaves):

$$\frac{1}{4 (a-b) b (a+b) d}$$

$$\left(-\left(2 \left(4 a A b-4 b^2 B+4 a b C\right) \text{Cos}[c+d x]^2 \text{EllipticPi}\left[-\frac{a}{b}, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right] (b+a \text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2}\right.\right.$$

$$\left.\text{Sin}[c+d x]\right) \Big/ \left(b (a+b \text{Cos}[c+d x]) \left(1-\text{Cos}[c+d x]^2\right)\right)+$$

$$\left(2 \left(-A b^2+a b B+a^2 C-2 b^2 C\right) \text{Cos}[c+d x]^2 \left(\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right]+\text{EllipticPi}\left[-\frac{a}{b}, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right]\right)\right.$$

$$\left.(b+a \text{Sec}[c+d x]) \sqrt{1-\text{Sec}[c+d x]^2}\ \text{Sin}[c+d x]\right) \Big/ \left(a (a+b \text{Cos}[c+d x]) \left(1-\text{Cos}[c+d x]^2\right)\right)+$$

$$\left(\left(A b^2-a b B+3 a^2 C-2 b^2 C\right) \text{Cos}[2 (c+d x)] (b+a \text{Sec}[c+d x]) \left(-4 a b+4 a b \text{Sec}[c+d x]^2-4 a b \text{EllipticE}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right]\right.\right.$$

$$\sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+2 (2 a-b) b \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}+$$

$$4 a^2 \text{EllipticPi}\left[-\frac{a}{b}, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}-$$

$$\left.2 b^2 \text{EllipticPi}\left[-\frac{a}{b}, -\text{ArcSin}\left[\sqrt{\text{Sec}[c+d x]}\right], -1\right] \sqrt{\text{Sec}[c+d x]} \sqrt{1-\text{Sec}[c+d x]^2}\right) \text{Sin}[c+d x]\Big) \Big/$$

$$\left.\left(a b^2 (a+b \text{Cos}[c+d x]) \left(1-\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]} \left(2-\text{Sec}[c+d x]^2\right)\right)\right)+$$

$$\frac{\sqrt{\text{Sec}[c+d x]} \left(\frac{\left(A b^2-a b B+a^2 C\right) \text{Sin}[c+d x]}{b^2 \left(-a^2+b^2\right)}+\frac{-a A b^2 \text{Sin}[c+d x]+a^2 b B \text{Sin}[c+d x]-a^3 C \text{Sin}[c+d x]}{b^2 \left(-a^2+b^2\right) (a+b \text{Cos}[c+d x])}\right)}{d}$$

- **Problem 1502: Attempted integration timed out after 120 seconds.**

$$\int \sqrt{a+b \text{Cos}[c+d x]} \left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^{11/2} \, dx$$

Optimal (type 4, 592 leaves, 8 steps):

$$-\frac{1}{315\,a^5\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(16\,A\,b^4-57\,a^3\,b\,B-24\,a\,b^3\,B+6\,a^2\,b^2\,(4\,A+7\,C)-21\,a^4\,(7\,A+9\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{315\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(16\,A\,b^3+12\,a\,b^2\,(A-2\,B)+6\,a^2\,b\,(6\,A-3\,B+7\,C)+3\,a^3\,(49\,A-25\,B+63\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{2\,\left(8\,A\,b^3+75\,a^3\,B-12\,a\,b^2\,B+a^2\,b\,(13\,A+21\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,a^3\,d}-$$

$$\frac{2\,\left(6\,A\,b^2-9\,a\,b\,B-7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{315\,a^2\,d}+$$

$$\frac{2\,(A\,b+9\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,a\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 1503: Attempted integration timed out after 120 seconds.**

$$\int\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 487 leaves, 7 steps):

$$\frac{1}{105 a^4 d \sqrt{\text{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \left(8 A b^3+63 a^3 B-14 a b^2 B+a^2 b (19 A+35 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]$$
$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} + \frac{1}{105 a^3 d \sqrt{\text{Sec}[c+d x]}}$$
$$2 (a-b) \sqrt{a+b} \left(8 A b^2+2 a b (3 A-7 B)+a^2 (25 A-63 B+35 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} - \frac{2 \left(4 A b^2-7 a b B-5 a^2 (5 A+7 C)\right) \sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{105 a^2 d} +$$
$$\frac{2 (A b+7 a B) \sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{5/2} \text{Sin}[c+d x]}{35 a d} + \frac{2 A \sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{7/2} \text{Sin}[c+d x]}{7 d}$$

Result (type 1, 1 leaves) :

???

## ▪ Problem 1504: Attempted integration timed out after 120 seconds.

$$\int \sqrt{a+b\,\text{Cos}[c+d x]}\ \left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^{7/2}\, dx$$

Optimal (type 4, 400 leaves, 6 steps) :

$$-\frac{1}{15 a^3 d \sqrt{\text{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \left(2 A b^2-5 a b B-3 a^2 (3 A+5 C)\right) \sqrt{\text{Cos}[c+d x]}$$
$$\text{Csc}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} -$$
$$\frac{1}{15 a^2 d \sqrt{\text{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \left(2 A b+a (9 A-5 B+15 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]$$
$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}} +$$
$$\frac{2 (A b+5 a B) \sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{15 a d} + \frac{2 A \sqrt{a+b\,\text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{5/2} \text{Sin}[c+d x]}{5 d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1505: Result more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b\,\text{Cos}[c+d\,x]}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 467 leaves, 7 steps):

$$\frac{1}{3\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,(A\,b+3\,a\,B)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{3\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,(b\,(A-3\,B)-a\,(A-3\,B+3\,C))\,\sqrt{\text{Cos}[c+d\,x]}$$
$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{d\,\sqrt{\text{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 5188 leaves):

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{2\,(A\,b+3\,a\,B)\,\text{Sin}[c+d\,x]}{3\,a}+\frac{2}{3}\,A\,\text{Tan}[c+d\,x]\right)}{d}-$$
$$\left(2\left(-\frac{A\,b}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{a\,B}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\right.\right.$$
$$\frac{b\,C}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a\,A\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{A\,b^2\,\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{a\,C\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$
$$\left.\frac{A\,b^2\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,a\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{b\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right)\sqrt{\text{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Sec}[c+d\,x]}$$
$$\left(12\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.$$
$$2\,(a+b)\,(A\,b+3\,a\,B)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2-$$

$$2\,a\,(b\,(A+3\,B-3\,C)+a\,(A+3\,(B+C)))\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2+a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+A\,b^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+3\,a^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+3\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$12\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2-$$

$$2\,A\,b^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-6\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+$$

$$A\,b^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-3\,a^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+3\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5\Bigg)\Bigg)\Bigg/$$

$$\Bigg(3\,a\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\Big(\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{3/2}\,\Bigg(-\frac{1}{3\,a\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\Big(\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\Big)^{3/2}}\,b\,\sqrt{\text{Cos}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\text{Sec}[c+d\,x]}$$

$$\text{Sin}[c+d\,x]\,\Bigg(12\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]+2\,(a+b)$$

$$(A\,b+3\,a\,B)\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2-$$

$$2\,a\,(b\,(A+3\,B-3\,C)+a\,(A+3\,(B+C)))\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]$$

$$\text{Sec}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2+a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+A\,b^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+3\,a^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+3\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+$$

$$12\,a\,b\,C\,\sqrt{\frac{\text{Cos}[c+d\,x]}{1+\text{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\text{Cos}[c+d\,x]}{(a+b)\,(1+\text{Cos}[c+d\,x])}}\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2-$$

$$2\,A\,b^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-6\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-a\,A\,b\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+A\,b^2\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-3\,a^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+$$

$$3\,a\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5\Bigg)+\frac{1}{a\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}}\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]$$

$$\Bigg(12\,a\,b\,C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$2\,(a+b)\,(A\,b+3\,a\,B)\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2-$$

$$2\,a\,(b\,(A+3\,B-3\,C)+a\,(A+3\,(B+C)))\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+a\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a^2\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+3\,a\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+$$

$$12\,a\,b\,C\,\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-$$

$$2\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-6\,a\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3-a\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-$$

$$3\,a^2\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5\Bigg)-\frac{1}{3\,a\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\left(\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}}$$

$$2\,\sqrt{\mathrm{Cos}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Sec}[c+d\,x]}\,\Bigg(\frac{1}{2}\,a\,A\,b\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+\frac{1}{2}\,A\,b^2\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+\frac{3}{2}\,a^2\,B\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+$$

$$\frac{3}{2}\,a\,b\,B\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2+\frac{1}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}6\,a\,b\,C\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left(\frac{\mathrm{Cos}[c+d\,x]\,\mathrm{Sin}[c+d\,x]}{(1+\mathrm{Cos}[c+d\,x])^2}-\frac{\mathrm{Sin}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}\right)+\frac{1}{\sqrt{\frac{\mathrm{Cos}[c+d\,x]}{1+\mathrm{Cos}[c+d\,x]}}}(a+b)\,(A\,b+3\,a\,B)\,\sqrt{\frac{a+b\,\mathrm{Cos}[c+d\,x]}{(a+b)\,(1+\mathrm{Cos}[c+d\,x])}}$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \left(\frac{\text{Cos}[c+d x] \text{Sin}[c+d x]}{(1+\text{Cos}[c+d x])^2} - \frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right) - \frac{1}{\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}}$$

$$a (b (A+3 B-3 C)+a (A+3 (B+C))) \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}} \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \left(\frac{\text{Cos}[c+d x] \text{Sin}[c+d x]}{(1+\text{Cos}[c+d x])^2} - \frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right) + \frac{1}{\sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}}} 6 a b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}$$

$$\text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \left(-\frac{b \text{Sin}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])} + \frac{(a+b \text{Cos}[c+d x]) \text{Sin}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])^2}\right) +$$

$$\frac{1}{\sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}}} (a+b) (A b+3 a B) \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \left(-\frac{b \text{Sin}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])} + \frac{(a+b \text{Cos}[c+d x]) \text{Sin}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])^2}\right) - \frac{1}{\sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}}}$$

$$a (b (A+3 B-3 C)+a (A+3 (B+C))) \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\left(-\frac{b \text{Sin}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])} + \frac{(a+b \text{Cos}[c+d x]) \text{Sin}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])^2}\right) + 2 (a+b) (A b+3 a B) \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}}$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] - 2 a (b (A+3 B-3 C)+a (A+3 (B+C)))$$

$$\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}} \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$12 a b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b) (1+\text{Cos}[c+d x])}} \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]-3 A b^2 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-9 a b B \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2+\frac{1}{\sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}}$$

$$6 a b C \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}} \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\left(\frac{\text{Cos}[c+d x] \text{Sin}[c+d x]}{(1+\text{Cos}[c+d x])^2}-\frac{\text{Sin}[c+d x]}{1+\text{Cos}[c+d x]}\right)$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2+\frac{1}{\sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}}} 6 a b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left(-\frac{b \text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}+\frac{(a+b \text{Cos}[c+d x]) \text{Sin}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])^2}\right) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-\frac{5}{2} a A b \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^4+$$

$$\frac{5}{2} A b^2 \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^4-\frac{15}{2} a^2 B \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^4+\frac{15}{2} a b B \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^4-$$

$$\frac{a (b (A+3 B-3 C)+a (A+3 (B+C))) \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}} \text{Sec}\left[\frac{1}{2}(c+d x)\right]^4}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{1-\frac{(-a+b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}-$$

$$\frac{6 a b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}} \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{1-\frac{(-a+b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}-$$

$$\frac{6 a b C \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}} \sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}} \text{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{1-\frac{(-a+b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}+\left((a+b)(A b+3 a B) \sqrt{\frac{\text{Cos}[c+d x]}{1+\text{Cos}[c+d x]}}\right.$$

$$\left.\sqrt{\frac{a+b \text{Cos}[c+d x]}{(a+b)(1+\text{Cos}[c+d x])}} \text{Sec}\left[\frac{1}{2}(c+d x)\right]^4 \sqrt{1-\frac{(-a+b) \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right) \Big/ \left(\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)\Bigg)-$$

$$\left(\left(12\, a\, b\, C \sqrt{\frac{\mathrm{Cos}[c+d x]}{1+\mathrm{Cos}[c+d x]}} \sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{(a+b)\,(1+\mathrm{Cos}[c+d x])}}\, \mathrm{EllipticPi}\left[-1, -\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] + 2\,(a+b)\right.\right.$$

$$(A\, b+3\, a\, B) \sqrt{\frac{\mathrm{Cos}[c+d x]}{1+\mathrm{Cos}[c+d x]}} \sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{(a+b)\,(1+\mathrm{Cos}[c+d x])}}\, \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 -$$

$$2\, a\, (b\, (A+3\, B-3\, C)+a\, (A+3\, (B+C))) \sqrt{\frac{\mathrm{Cos}[c+d x]}{1+\mathrm{Cos}[c+d x]}} \sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{(a+b)\,(1+\mathrm{Cos}[c+d x])}}\, \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 + a\, A\, b\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] + A\, b^2\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] + 3\, a^2\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] + 3\, a\, b\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right] +$$

$$12\, a\, b\, C \sqrt{\frac{\mathrm{Cos}[c+d x]}{1+\mathrm{Cos}[c+d x]}} \sqrt{\frac{a+b\,\mathrm{Cos}[c+d x]}{(a+b)\,(1+\mathrm{Cos}[c+d x])}}\, \mathrm{EllipticPi}\left[-1, -\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right] \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2 -$$

$$2\, A\, b^2\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3 - 6\, a\, b\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^3 - a\, A\, b\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5 + A\, b^2\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5 - 3\, a^2\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5 +$$

$$\left.3\, a\, b\, B\, \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^5\right) \left(-\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right] \mathrm{Sec}[c+d x]\, \mathrm{Sin}\left[\frac{1}{2}(c+d x)\right] + \mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Sec}[c+d x]\, \mathrm{Tan}[c+d x]\right)\Bigg) \Bigg/$$

$$\left.\left(3\, a \sqrt{a+b\,\mathrm{Cos}[c+d x]} \left(\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right)^{3/2} \sqrt{\mathrm{Cos}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Sec}[c+d x]}\right)\right)$$

- **Problem 1507: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b\,\mathrm{Cos}[c+d x]}\, \left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right) \sqrt{\mathrm{Sec}[c+d x]}\, dx$$

Optimal (type 4, 543 leaves, 8 steps) :

$$-\frac{1}{4\,a\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,(4\,b\,B+a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{1}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,(8\,A\,b+a\,C+2\,b\,(2\,B+C))\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(8\,A\,b^2+4\,a\,b\,B-a^2\,C+4\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{(4\,b\,B+a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b\,d}$$

Result (type 4, 1816 leaves) :

$$\frac{C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{4\,d}+$$

$$\Bigg(-4\,a\,b\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-4\,b^2\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-a^2\,\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-$$

$$a\,b\,\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+8\,b^2\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+2\,a\,b\,\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+$$

$$4\,a\,b\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-4\,b^2\,\sqrt{\frac{a-b}{a+b}}\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+a^2\,\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-$$

$$a\,b\,\sqrt{\frac{a-b}{a+b}}\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+16\,i\,A\,b^2\,\text{EllipticPi}\Big[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+8\,i\,a\,b\,B\,\text{EllipticPi}\Big[\frac{a+b}{a-b},\,i\,\text{ArcSinh}\Big[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,-\frac{a+b}{a-b}\Big]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$2\,\mathrm{i}\,a^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+8\,\mathrm{i}\,b^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$16\,\mathrm{i}\,A\,b^2\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+8\,\mathrm{i}\,a\,b\,B\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$2\,\mathrm{i}\,a^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+8\,\mathrm{i}\,b^2\,C\,\text{EllipticPi}\left[\frac{a+b}{a-b},\,\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$\mathrm{i}\,(a-b)\,(4\,b\,B+a\,C)\,\text{EllipticE}\left[\mathrm{i}\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+2\,i\,(a-b)\,(4\,A\,b+(a+2\,b)\,C)\,\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\Bigg)\Bigg/$$

$$\left(4\,b\,\sqrt{\frac{a-b}{a+b}}\,d\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)$$

## Problem 1508: Result more than twice size of optimal antiderivative.

$$\int\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)}{\sqrt{\mathrm{Sec}[c+d x]}}\,dx$$

Optimal (type 4, 646 leaves, 9 steps):

$$-\frac{1}{24\,a\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d x]}}(a-b)\sqrt{a+b}\,\left(8\,b^2\,(3\,A+2\,C)+3\,a\,(2\,b\,B-a\,C)\right)\sqrt{\mathrm{Cos}[c+d x]}$$

$$\mathrm{Csc}[c+d x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}+$$

$$\frac{1}{24\,b^2\,d\,\sqrt{\mathrm{Sec}[c+d x]}}\sqrt{a+b}\,\left(24\,A\,b^2+(a+2\,b)\,(6\,b\,B-3\,a\,C+8\,b\,C)\right)\sqrt{\mathrm{Cos}[c+d x]}\,\mathrm{Csc}[c+d x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}+\frac{1}{8\,b^3\,d\,\sqrt{\mathrm{Sec}[c+d x]}}$$

$$\sqrt{a+b}\,\left(2\,a^2\,b\,B-8\,b^3\,B-a^3\,C-4\,a\,b^2\,(2\,A+C)\right)\sqrt{\mathrm{Cos}[c+d x]}\,\mathrm{Csc}[c+d x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d x])}{a-b}}+\frac{(2\,b\,B-a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\mathrm{Sin}[c+d x]}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d x]}}+$$

$$\frac{C\,(a+b\,\mathrm{Cos}[c+d x])^{3/2}\,\mathrm{Sin}[c+d x]}{3\,b\,d\,\sqrt{\mathrm{Sec}[c+d x]}}+\frac{\left(8\,b^2\,(3\,A+2\,C)+3\,a\,(2\,b\,B-a\,C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d x]}\,\sqrt{\mathrm{Sec}[c+d x]}\,\mathrm{Sin}[c+d x]}{24\,b^2\,d}$$

Result (type 4, 3904 leaves):

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\left(\frac{1}{12}\,C\,\text{Sin}[c+d\,x]+\frac{(6\,b\,B+a\,C)\,\text{Sin}[2\,(c+d\,x)]}{24\,b}+\frac{1}{12}\,C\,\text{Sin}[3\,(c+d\,x)]\right)}{d}+$$

$$\Bigg(\Bigg(\frac{a\,A}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{b\,B}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{7\,a\,C}{12\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{A\,b\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{3\,a\,B\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{a^2\,C\,\sqrt{\text{Sec}[c+d\,x]}}{48\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\,C\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{A\,b\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{a\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{a^2\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{16\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\Bigg)$$

$$\Bigg(\frac{\left(24\,A\,b^2+6\,a\,b\,B-3\,a^2\,C+16\,b^2\,C\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{24\,b^2\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}+$$

$$\Bigg(\Bigg((a+b)\,\left(-24\,A\,b^2-6\,a\,b\,B+3\,a^2\,C-16\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$2\,b\,\left(12\,b^2\,B-a^2\,C+2\,a\,b\,(12\,A-3\,B+7\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+6\,\left(-2\,a^2\,b\,B+8\,b^3\,B+a^3\,C+4\,a\,b^2\,(2\,A+C)\right)$$

$$\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(24\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\Bigg)\Bigg)\Bigg/$$

$$\left(d\left(\frac{\left(24\,A\,b^2+6\,a\,b\,B-3\,a^2\,C+16\,b^2\,C\right)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{48\,b^2\,\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}-\right.\right.$$

$$\left(\left((a+b)\,\left(-24\,A\,b^2-6\,a\,b\,B+3\,a^2\,C-16\,b^2\,C\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\,\left(12\,b^2\,B-a^2\,C+2\,a\,b\,(12\,A-3\,B+7\,C)\right)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$\left.6\,\left(-2\,a^2\,b\,B+8\,b^3\,B+a^3\,C+4\,a\,b^2\,(2\,A+C)\right)\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2$$

$$\left.\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\Bigg/\left(24\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right.$$

$$\left.\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)-$$

$$\left(\left((a+b)\,\left(-24\,A\,b^2-6\,a\,b\,B+3\,a^2\,C-16\,b^2\,C\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\,\left(12\,b^2\,B-a^2\,C+2\,a\,b\,(12\,A-3\,B+7\,C)\right)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+6\,\left(-2\,a^2\,b\,B+8\,b^3\,B+a^3\,C+4\,a\,b^2\,(2\,A+C)\right)$$

$$\left.\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)\,\left(a\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\left.\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)\Bigg/$$

$$\left(48\,b^2\,(a+b)^2\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\left(\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}\right)^{3/2}\right)-$$

$$\Bigg(\Big((a+b)\left(-24 A b^2-6 a b B+3 a^2 C-16 b^2 C\right) \text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big], \frac{-a+b}{a+b}\Big]+$$

$$2 b\left(12 b^2 B-a^2 C+2 a b(12 A-3 B+7 C)\right) \text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big], \frac{-a+b}{a+b}\Big]+$$

$$6\left(-2 a^2 b B+8 b^3 B+a^3 C+4 a b^2(2 A+C)\right) \text{EllipticPi}\Big[-1,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big], \frac{-a+b}{a+b}\Big]\Big)$$

$$\text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2 \text{Tan}\Big[\frac{1}{2}(c+d x)\Big] \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^4}\Bigg) \Big/$$

$$\left(24 b^2(a+b) \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\right)^2 \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)-$$

$$\Bigg(\Big((a+b)\left(-24 A b^2-6 a b B+3 a^2 C-16 b^2 C\right) \text{EllipticE}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big], \frac{-a+b}{a+b}\Big]+$$

$$2 b\left(12 b^2 B-a^2 C+2 a b(12 A-3 B+7 C)\right) \text{EllipticF}\Big[\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big], \frac{-a+b}{a+b}\Big]+$$

$$6\left(-2 a^2 b B+8 b^3 B+a^3 C+4 a b^2(2 A+C)\right) \text{EllipticPi}\Big[-1,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]\Big], \frac{-a+b}{a+b}\Big]\Big) \text{Sec}\Big[\frac{1}{2}(c+d x)\Big]^2$$

$$\text{Tan}\Big[\frac{1}{2}(c+d x)\Big] \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{1-\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^4}\Bigg) \Big/$$

$$\left(48 b^2(a+b)\left(-1+\text{Tan}\Big[\frac{1}{2}(c+d x)\Big]^2\right) \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)-$$

$$\Bigg(\left(24 A b^2+6 a b B-3 a^2 C+16 b^2 C\right) \text{Tan}\Big[\frac{1}{2}(c+d x)\Big] \sqrt{\frac{a+b+a \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}$$

$$\left(\frac{\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]}{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}+\frac{\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2}\right)\right)\Bigg/\left(48 b^2\left(\frac{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)^{3/2}\right)+$$

$$\left(\left(24 A b^2+6 a b B-3 a^2 C+16 b^2 C\right) \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\left(\frac{a \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-b \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]}{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}-\right.\right.$$

$$\left.\left.\frac{\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\left(a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2}\right)\right)\Bigg/$$

$$\left(48 b^2 \sqrt{\frac{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)+$$

$$\left(\left((a+b)\left(-24 A b^2-6 a b B+3 a^2 C-16 b^2 C\right) \operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+\right.\right.$$

$$2 b\left(12 b^2 B-a^2 C+2 a b(12 A-3 B+7 C)\right) \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]+$$

$$\left.6\left(-2 a^2 b B+8 b^3 B+a^3 C+4 a b^2(2 A+C)\right) \operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right], \frac{-a+b}{a+b}\right]\right)$$

$$\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^4}\left(\frac{a \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-b \operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]}{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}-\right.$$

$$\left.\left.\frac{\operatorname{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\left(a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2}\right)\right)\Bigg/$$

$$\left(48 b^2(a+b) \sqrt{\frac{1}{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b \operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right.$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\Bigg)+\Bigg(\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}$$

$$\Bigg(\frac{b\left(12\,b^2\,B-a^2\,C+2\,a\,b\,(12\,A-3\,B+7\,C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}-\frac{3\left(-2\,a^2\,b\,B+8\,b^3\,B+a^3\,C+4\,a\,b^2\,(2\,A+C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+$$

$$\frac{(a+b)\left(-24\,A\,b^2-6\,a\,b\,B+3\,a^2\,C-16\,b^2\,C\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}{2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\Bigg)\Bigg)\Bigg/$$

$$\left(24\,b^2\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\Bigg)\Bigg)$$

- **Problem 1509: Result more than twice size of optimal antiderivative.**

$$\int\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)}{\mathrm{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 766 leaves, 10 steps) :

$$\frac{1}{192\,a\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(24\,a^2\,b\,B-128\,b^3\,B-15\,a^3\,C-4\,a\,b^2\,(12\,A+7\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{192\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(15\,a^3\,C-2\,a^2\,b\,(12\,B+5\,C)+4\,a\,b^2\,(12\,A+4\,B+7\,C)+8\,b^3\,(12\,A+16\,B+9\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{64\,b^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(8\,a^3\,b\,B+32\,a\,b^3\,B-5\,a^4\,C-8\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{C\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{4\,b\,d\,\text{Sec}[c+d\,x]^{3/2}}+\frac{\left(16\,A\,b^2-8\,a\,b\,B+5\,a^2\,C+12\,b^2\,C\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{32\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{(8\,b\,B-5\,a\,C)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{\left(24\,a^2\,b\,B-128\,b^3\,B-15\,a^3\,C-4\,a\,b^2\,(12\,A+7\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{192\,b^3\,d}$$

Result (type 4, 4399 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(\frac{(8\,b\,B+a\,C)\,\text{Sin}[c+d\,x]}{96\,b}+\frac{\left(48\,A\,b^2+8\,a\,b\,B-5\,a^2\,C+48\,b^2\,C\right)\,\text{Sin}[2\,(c+d\,x)]}{192\,b^2}+\frac{(8\,b\,B+a\,C)\,\text{Sin}[3\,(c+d\,x)]}{96\,b}+\frac{1}{32}\,C\,\text{Sin}[4\,(c+d\,x)]\right)+$$

$$\Bigg(\left(\frac{A\,b}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{7\,a\,B}{12\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{a^2\,C}{96\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\right.$$

$$\frac{3\,b\,C}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{3\,a\,A\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{a^2\,B\,\sqrt{\text{Sec}[c+d\,x]}}{48\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b\,B\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{25\,a\,C\,\sqrt{\mathrm{Sec}[c+d\,x]}}{96\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{5\,a^3\,C\,\sqrt{\mathrm{Sec}[c+d\,x]}}{384\,b^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{a\,A\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}-\frac{a^2\,B\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{16\,b\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+$$

$$\left.\frac{b\,B\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{7\,a\,C\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{96\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}+\frac{5\,a^3\,C\,\mathrm{Cos}[2\,(c+d\,x)]\,\sqrt{\mathrm{Sec}[c+d\,x]}}{128\,b^2\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\right)$$

$$\left(-\left(\left(\left((a+b)\,\left(-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(12\,A+7\,C)\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-\right.\right.\right.\right.$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,(-4\,B+C)+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-28\,B+9\,C)\right)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$\left.6\,\left(-8\,a^3\,b\,B-32\,a\,b^3\,B+5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)$$

$$\left.\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)\Big/$$

$$\left.\left.\left(192\,b^3\,(a+b)\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)+$$

$$\left.\left.\frac{\left(48\,a\,A\,b^2-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+28\,a\,b^2\,C\right)\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{a+\frac{b-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{192\,b^3\,\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\right)\Big/$$

$$\left(d\,\left(\left(\left((a+b)\,\left(-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(12\,A+7\,C)\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-\right.\right.\right.\right.$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,(-4\,B+C)+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-28\,B+9\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\,\left(-8\,a^3\,b\,B-32\,a\,b^3\,B+5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^3\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\Bigg)\Bigg/\Bigg(192\,b^3\,(a+b)$$

$$\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)+$$

$$\Bigg(\Bigg((a+b)\,\left(-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(12\,A+7\,C)\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,(-4\,B+C)+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-28\,B+9\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\,\left(-8\,a^3\,b\,B-32\,a\,b^3\,B+5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\left(a\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\text{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(384\,b^3\,(a+b)^2\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\left(\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}\right)^{3/2}\right)+$$

$$\Bigg(\Bigg((a+b)\,\left(-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(12\,A+7\,C)\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-$$

$$2\,b\,\left(5\,a^3\,C+2\,a^2\,b\,(-4\,B+C)+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-28\,B+9\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$6\,\left(-8\,a^3\,b\,B-32\,a\,b^3\,B+5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\Bigg)$$

$$\left.\operatorname{Sec}\left[\frac{1}{2}(c+dx)\right]^2\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^4}\right)\Bigg/$$

$$\left(192\,b^3(a+b)\sqrt{\frac{1}{1-\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\left(-1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}\right)+$$

$$\left(\left((a+b)\left(-24a^2bB+128b^3B+15a^3C+4ab^2(12A+7C)\right)\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]-\right.\right.$$

$$2b\left(5a^3C+2a^2b(-4B+C)+24b^3(4A+3C)-4ab^2(12A-28B+9C)\right)\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.6\left(-8a^3bB-32ab^3B+5a^4C+8a^2b^2(2A+C)-16b^4(4A+3C)\right)\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\left.\operatorname{Sec}\left[\frac{1}{2}(c+dx)\right]^2\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\sqrt{\frac{1}{1-\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^4}\right)\Bigg/$$

$$\left(384\,b^3(a+b)\left(-1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{a+b}}\right)+$$

$$\left(\left(48aAb^2-24a^2bB+128b^3B+15a^3C+28ab^2C\right)\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\right.$$

$$\left.\left(-\frac{b\operatorname{Sec}\left[\frac{1}{2}(c+dx)\right]^2\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]}{1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}-\frac{\operatorname{Sec}\left[\frac{1}{2}(c+dx)\right]^2\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]\left(b-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)}{\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2\right)^2}\right)\right)\Bigg/$$

$$\left(384\,b^3\sqrt{\frac{1}{1-\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\sqrt{1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}\sqrt{a+\frac{b-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\right)-$$

$$\left(\left(48aAb^2-24a^2bB+128b^3B+15a^3C+28ab^2C\right)\operatorname{Sec}\left[\frac{1}{2}(c+dx)\right]^2\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2\sqrt{a+\frac{b-b\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2}(c+dx)\right]^2}}\right)\Bigg/$$

$$\left(384\, b^3 \sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\right)+$$

$$\frac{\left(48\,a\,A\,b^2-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+28\,a\,b^2\,C\right)\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{a+\frac{b-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}{384\,b^3\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}-$$

$$\left(\left(48\,a\,A\,b^2-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+28\,a\,b^2\,C\right)\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right.$$

$$\left.\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{a+\frac{b-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)\Bigg/\left(384\,b^3\sqrt{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)-$$

$$\left(\left((a+b)\left(-24\,a^2\,b\,B+128\,b^3\,B+15\,a^3\,C+4\,a\,b^2\,(12\,A+7\,C)\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]-\right.\right.$$

$$2\,b\left(5\,a^3\,C+2\,a^2\,b\,(-4\,B+C)+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-28\,B+9\,C)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$\left.6\left(-8\,a^3\,b\,B-32\,a\,b^3\,B+5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\,\left(\frac{a\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}-\right.$$

$$\left.\left.\frac{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\right)\right)\Bigg/$$

$$\left(384\,b^3\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right.$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;\Bigg)-\Bigg(\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\;\Bigg(-\frac{b\left(5\,a^3\,C+2\,a^2\,b\,(-4\,B+C)+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-28\,B+9\,C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}-$$

$$\frac{3\left(-8\,a^3\,b\,B-32\,a\,b^3\,B+5\,a^4\,C+8\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}}+\Bigg((a+b)\left(-24\,a^2\,b\,B+128\,b^3\,B+\right.$$

$$\left.15\,a^3\,C+4\,a\,b^2\,(12\,A+7\,C)\right)\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\Bigg)\Big/\left(2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\right)\Bigg)\Bigg)\Big/$$

$$\Bigg(192\,b^3\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\Bigg)\Bigg)\Bigg)$$

- **Problem 1510: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\mathrm{Sec}[c+d\,x]^{11/2}\,dx$$

Optimal (type 4, 590 leaves, 8 steps):

$$\frac{1}{315\,a^4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^4+246\,a^3\,b\,B-18\,a\,b^3\,B+21\,a^4\,(7\,A+9\,C)+3\,a^2\,b^2\,(11\,A+21\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{1}{315\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^3+6\,a\,b^2\,(A-3\,B)+3\,a^2\,b\,(13\,A-57\,B+21\,C)-3\,a^3\,(49\,A-25\,B+63\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{2\,\left(4\,A\,b^3-75\,a^3\,B-9\,a\,b^2\,B-2\,a^2\,b\,(44\,A+63\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{315\,a^2\,d}+$$

$$\frac{2\,\left(3\,A\,b^2+72\,a\,b\,B+7\,a^2\,(7\,A+9\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{315\,a\,d}+$$

$$\frac{2\,(A\,b+3\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{21\,d}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{9/2}\,\mathrm{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1511: Attempted integration timed out after 120 seconds.**

$$\int(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{9/2}\,dx$$

Optimal (type 4, 490 leaves, 7 steps) :

$$-\frac{1}{105\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(6\,A\,b^3-63\,a^3\,B-21\,a\,b^2\,B-2\,a^2\,b\,(41\,A+70\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,-$$

$$\frac{1}{105\,a^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(6\,A\,b^2-a^2\,(25\,A-63\,B+35\,C)+3\,a\,b\,(19\,A-7\,B+35\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],\,-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}\,+$$

$$\frac{2\,\left(3\,A\,b^2+42\,a\,b\,B+5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{105\,a\,d}+$$

$$\frac{2\,(3\,A\,b+7\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{35\,d}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\mathrm{Sec}[c+d\,x]^{7/2}\,\mathrm{Sin}[c+d\,x]}{7\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1514: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 595 leaves, 9 steps) :

$$\frac{1}{4\,a\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(8\,a\,A-4\,b\,B-5\,a\,C\right)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(a\,(8\,A-8\,B-5\,C)-2\,b\,(8\,A+2\,B+C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$
$$\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$
$$\sqrt{a+b}\,\left(8\,A\,b^2+12\,a\,b\,B+3\,a^2\,C+4\,b^2\,C\right)\sqrt{\mathrm{Cos}[c+d\,x]}\;\mathrm{Csc}[c+d\,x]\;\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$
$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{b\,(4\,A-C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}-$$
$$\frac{(8\,a\,A-4\,b\,B-5\,a\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{4\,d}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}\;\mathrm{Sin}[c+d\,x]}{d}$$

Result (type 4, 1469 leaves) :

$$\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\left(2\,a\,A\,\mathrm{Sin}[c+d\,x]+\frac{1}{4}\,b\,C\,\mathrm{Sin}[2\,(c+d\,x)]\right)}{d}+$$
$$\Bigg(8\,a^2\,A\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+8\,a\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-4\,a\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-4\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-5\,a^2\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$
$$5\,a\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-16\,a\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+8\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+10\,a\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-8\,a^2\,A\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$
$$8\,a\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+4\,a\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-4\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+5\,a^2\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-5\,a\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$
$$16\,A\,b^2\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$
$$24\,a\,b\,B\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$
$$6\,a^2\,C\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$8\, b^2\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} +$$

$$16\, A\, b^2\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} + 24\, a\, b\, B\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} + 6\, a^2\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} +$$

$$8\, b^2\, C\, \text{EllipticPi}\left[-1, -\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} + (a+b)\,(8\,a\,A-4\,b\,B-5\,a\,C)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}} -$$

$$2\left(4\,a^2\,(A+B-C)-2\,b^2\,(2\,A+C)+a\,b\,(8\,A-8\,B+C)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right], \frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right) \Big/$$

$$\left(4\,d\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}} \left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right) \left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)$$

- **Problem 1516: Result more than twice size of optimal antiderivative.**

$$\int \frac{(a+b\,\text{Cos}[c+d\,x])^{3/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)}{\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 764 leaves, 10 steps):

$$-\frac{1}{192\,a\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$
$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$
$$\frac{1}{192\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\left(9\,a^3\,C-6\,a^2\,b\,(4\,B+C)-8\,b^3\,(12\,A+16\,B+9\,C)-4\,a\,b^2\,(60\,A+28\,B+39\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$
$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{1}{64\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\left(8\,a^3\,b\,B-96\,a\,b^3\,B-3\,a^4\,C-24\,a^2\,b^2\,(2\,A+C)-16\,b^4\,(4\,A+3\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\;\text{Csc}[c+d\,x]$$
$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$
$$\frac{\left(4\,b^2\,(4\,A+3\,C)+a\,(8\,b\,B-3\,a\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\text{Sin}[c+d\,x]}{32\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{(8\,b\,B-3\,a\,C)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{24\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$
$$\frac{C\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{4\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}\;\text{Sin}[c+d\,x]}{192\,b^2\,d}$$

Result (type 4, 4478 leaves):

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}\left(\frac{1}{96}(8\,b\,B+9\,a\,C)\,\text{Sin}[c+d\,x]+\right.$$
$$\left.\frac{\left(48\,A\,b^2+56\,a\,b\,B+3\,a^2\,C+48\,b^2\,C\right)\text{Sin}[2\,(c+d\,x)]}{192\,b}+\frac{1}{96}(8\,b\,B+9\,a\,C)\,\text{Sin}[3\,(c+d\,x)]+\frac{1}{32}\,b\,C\,\text{Sin}[4\,(c+d\,x)]\right)+$$
$$\left(\left(\frac{a^2\,A}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}}+\frac{A\,b^2}{2\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}}+\frac{13\,a\,b\,B}{12\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\;\sqrt{\text{Sec}[c+d\,x]}}+\right.\right.$$

$$\frac{19\,a^2\,C}{32\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{3\,b^2\,C}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{7\,a\,A\,b\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{17\,a^2\,B\,\sqrt{\text{Sec}[c+d\,x]}}{48\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b^2\,B\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-\frac{a^3\,C\,\sqrt{\text{Sec}[c+d\,x]}}{128\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{19\,a\,b\,C\,\sqrt{\text{Sec}[c+d\,x]}}{32\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+$$

$$\frac{5\,a\,A\,b\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{8\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{a^2\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{16\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{b^2\,B\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{3\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\left.\frac{3\,a^3\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{128\,b\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}+\frac{13\,a\,b\,C\,\text{Cos}[2\,(c+d\,x)]\,\sqrt{\text{Sec}[c+d\,x]}}{32\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}\right)\left(\frac{1}{192\,b^2\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\right.$$

$$\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\;+$$

$$\left(\left((a+b)\,\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-12\,a\,b^2\,(20\,A+13\,C)\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\,\left(-3\,a^3\,C+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-52\,B+9\,C)+2\,a^2\,b\,(96\,A-28\,B+57\,C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]+$$

$$\left.6\,\left(-8\,a^3\,b\,B+96\,a\,b^3\,B+3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\right)$$

$$\left.\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\;\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\right)\Bigg/$$

$$\left.\left.\left(192\,b^2\,(a+b)\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\left(-1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\right)\Bigg/$$

$$\left(d\left(\frac{1}{384\,b^2\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}}\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\right.\right.$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;-$$

$$\left(\left((a+b)\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-12\,a\,b^2\,(20\,A+13\,C)\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\left(-3\,a^3\,C+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-52\,B+9\,C)+2\,a^2\,b\,(96\,A-28\,B+57\,C)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.6\left(-8\,a^3\,b\,B+96\,a\,b^3\,B+3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\left.\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)\Bigg/\left(192\,b^2\,(a+b)\right.$$

$$\left.\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\right)-$$

$$\left(\left((a+b)\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-12\,a\,b^2\,(20\,A+13\,C)\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\left(-3\,a^3\,C+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-52\,B+9\,C)+2\,a^2\,b\,(96\,A-28\,B+57\,C)\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.6\left(-8\,a^3\,b\,B+96\,a\,b^3\,B+3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\left(a\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-b\,\text{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right)$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(384\,b^2\,(a+b)^2\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\left(\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}\right)^{3/2}\right)-$$

$$\Bigg(\Bigg((a+b)\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-12\,a\,b^2\,(20\,A+13\,C)\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$2\,b\left(-3\,a^3\,C+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-52\,B+9\,C)+2\,a^2\,b\,(96\,A-28\,B+57\,C)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$6\left(-8\,a^3\,b\,B+96\,a\,b^3\,B+3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\Bigg)$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(192\,b^2\,(a+b)\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^2\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)-$$

$$\Bigg(\Bigg((a+b)\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-12\,a\,b^2\,(20\,A+13\,C)\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$2\,b\left(-3\,a^3\,C+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-52\,B+9\,C)+2\,a^2\,b\,(96\,A-28\,B+57\,C)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$6\left(-8\,a^3\,b\,B+96\,a\,b^3\,B+3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\Bigg)$$

$$\mathrm{Sec}\left[\frac{1}{2}(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\;\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^4}\Bigg)\Bigg/$$

$$\left(384\, b^2\, (a+b)\, \left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right) \sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right) -$$

$$\left(\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right.$$

$$\left.\left(\frac{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}+\frac{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\right)\right)\Big/$$

$$\left(384\,b^2\left(\frac{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\right)^{3/2}\right)+\left(\left(24\,a^2\,b\,B+128\,b^3\,B-9\,a^3\,C+12\,a\,b^2\,(20\,A+13\,C)\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right.$$

$$\left(\frac{a\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}-\right.$$

$$\left.\left.\frac{\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\left(a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)}{\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2}\right)\right)\Big/$$

$$\left(384\,b^2\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)+$$

$$\left(\left((a+b)\left(-24\,a^2\,b\,B-128\,b^3\,B+9\,a^3\,C-12\,a\,b^2\,(20\,A+13\,C)\right)\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+\right.\right.$$

$$2\,b\left(-3\,a^3\,C+24\,b^3\,(4\,A+3\,C)-4\,a\,b^2\,(12\,A-52\,B+9\,C)+2\,a^2\,b\,(96\,A-28\,B+57\,C)\right)\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]+$$

$$\left.6\left(-8\,a^3\,b\,B+96\,a\,b^3\,B+3\,a^4\,C+24\,a^2\,b^2\,(2\,A+C)+16\,b^4\,(4\,A+3\,C)\right)\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\right)$$

$$\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4}\left(\frac{a\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]-b\,\mathrm{Sec}\left[\frac{1}{2}\,(c+d\,x)\right]^2\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}-\right.$$

$$\left.\left.\frac{\mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]\left(a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)}{\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^2}\right)\right) \Big/ \left(384\, b^2 (a+b) \sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right.$$

$$\left.\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} \sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)+$$

$$\left(\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^4} \left(\left(b\left(-3 a^3 C+24 b^3 (4 A+3 C)-4 a b^2 (12 A-52 B+9 C)+\right.\right.\right.\right.$$

$$\left.\left.2 a^2 b (96 A-28 B+57 C)\right) \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2\right) \Big/ \left(\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)-$$

$$\frac{3\left(-8 a^3 b B+96 a b^3 B+3 a^4 C+24 a^2 b^2 (2 A+C)+16 b^4 (4 A+3 C)\right) \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2}{\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}}+\left((a+b)\left(-24 a^2 b B-128 b^3 B+\right.\right.$$

$$\left.\left.\left.\left.9 a^3 C-12 a b^2 (20 A+13 C)\right) \mathrm{Sec}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\frac{(-a+b)\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right) \Big/ \left(2 \sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\right)\right)\right) \Big/$$

$$\left.\left.\left(192\, b^2 (a+b) \sqrt{\frac{1}{1-\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\left(-1+\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right)\right)\right)$$

- **Problem 1517: Attempted integration timed out after 120 seconds.**

$$\int (a+b\,\mathrm{Cos}[c+d x])^{5/2}\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right) \mathrm{Sec}[c+d x]^{13/2}\, dx$$

Optimal (type 4, 705 leaves, 9 steps) :

$$\frac{1}{3465 a^4 d \sqrt{\mathrm{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \left(40 A b^5+1617 a^5 B+3069 a^3 b^2 B-110 a b^4 B+15 a^2 b^3 (17 A+33 C)+15 a^4 b (247 A+319 C)\right) \sqrt{\mathrm{Cos}[c+d x]} \mathrm{Csc}[c+d x] \mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b \mathrm{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\mathrm{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\mathrm{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\mathrm{Sec}[c+d x])}{a-b}} + \frac{1}{3465 a^3 d \sqrt{\mathrm{Sec}[c+d x]}} 2 (a-b) \sqrt{a+b} \left(40 A b^4+10 a b^3 (3 A-11 B)+15 a^2 b^2 (19 A-121 B+33 C)+3 a^4 (225 A-539 B+275 C)-6 a^3 b (505 A-209 B+660 C)\right) \sqrt{\mathrm{Cos}[c+d x]} \mathrm{Csc}[c+d x] \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b \mathrm{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\mathrm{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\mathrm{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\mathrm{Sec}[c+d x])}{a-b}} - \frac{1}{3465 a^2 d} 2 \left(20 A b^4-1793 a^3 b B-55 a b^3 B-75 a^4 (9 A+11 C)-5 a^2 b^2 (205 A+297 C)\right) \sqrt{a+b \mathrm{Cos}[c+d x]} \mathrm{Sec}[c+d x]^{3/2} \mathrm{Sin}[c+d x] + \frac{2 \left(15 A b^3+539 a^3 B+825 a b^2 B+5 a^2 b (229 A+297 C)\right) \sqrt{a+b \mathrm{Cos}[c+d x]} \mathrm{Sec}[c+d x]^{5/2} \mathrm{Sin}[c+d x]}{3465 a d} + \frac{2 \left(5 A b^2+44 a b B+3 a^2 (9 A+11 C)\right) \sqrt{a+b \mathrm{Cos}[c+d x]} \mathrm{Sec}[c+d x]^{7/2} \mathrm{Sin}[c+d x]}{231 d} + \frac{2 (5 A b+11 a B) (a+b \mathrm{Cos}[c+d x])^{3/2} \mathrm{Sec}[c+d x]^{9/2} \mathrm{Sin}[c+d x]}{99 d} + \frac{2 A (a+b \mathrm{Cos}[c+d x])^{5/2} \mathrm{Sec}[c+d x]^{11/2} \mathrm{Sin}[c+d x]}{11 d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1518: Attempted integration timed out after 120 seconds.**

$$\int (a+b \mathrm{Cos}[c+d x])^{5/2} \left(A+B \mathrm{Cos}[c+d x]+C \mathrm{Cos}[c+d x]^2\right) \mathrm{Sec}[c+d x]^{11/2} \, dx$$

Optimal (type 4, 592 leaves, 8 steps) :

$$-\frac{1}{315\,a^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^4-435\,a^3\,b\,B-45\,a\,b^3\,B-21\,a^4\,(7\,A+9\,C)-3\,a^2\,b^2\,(93\,A+161\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{315\,a^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(10\,A\,b^3+15\,a\,b^2\,(11\,A-3\,B+21\,C)-6\,a^2\,b\,(19\,A-60\,B+28\,C)+3\,a^3\,(49\,A-25\,B+63\,C)\right)$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\left(5\,A\,b^3+75\,a^3\,B+135\,a\,b^2\,B+a^2\,b\,(163\,A+231\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{315\,a\,d}+$$

$$\frac{2\left(15\,A\,b^2+90\,a\,b\,B+7\,a^2\,(7\,A+9\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{315\,d}+$$

$$\frac{2\,(5\,A\,b+9\,a\,B)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{63\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sec}[c+d\,x]^{9/2}\,\text{Sin}[c+d\,x]}{9\,d}$$

Result (type 1, 1 leaves):

???

- **Problem 1521: Result more than twice size of optimal antiderivative.**

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\,\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}\,dx$$

Optimal (type 4, 682 leaves, 10 steps):

$$\frac{1}{12\,a\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(24\,a^2\,B-12\,b^2\,B+a\,b\,(56\,A-27\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{12\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(a\,b\,(56\,A-72\,B-27\,C)-6\,b^2\,(12\,A+2\,B+C)-8\,a^2\,(A-3\,B+3\,C)\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\left(8\,A\,b^2+20\,a\,b\,B+15\,a^2\,C+4\,b^2\,C\right)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticPi}\left[\frac{a+b}{b},\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-\frac{b\,(8\,A\,b+4\,a\,B-b\,C)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}-$$

$$\frac{\left(24\,a^2\,B-12\,b^2\,B+a\,b\,(56\,A-27\,C)\right)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{12\,d}+$$

$$\frac{2\,(5\,A\,b+3\,a\,B)\,(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}\,\mathrm{Sin}[c+d\,x]}{3\,d}+\frac{2\,A\,(a+b\,\mathrm{Cos}[c+d\,x])^{5/2}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,d}$$

Result (type 4, 1640 leaves) :

$$\Bigg(56\,a^2\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+56\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+24\,a^3\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]+24\,a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-12\,a\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$12\,b^3\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-27\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-27\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]-112\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-48\,a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+$$

$$24\,b^3\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+54\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-56\,a^2\,A\,b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+56\,a\,A\,b^2\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-24\,a^3\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$24\,a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+12\,a\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-12\,b^3\,B\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+27\,a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-27\,a\,b^2\,C\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$48\,A\,b^3\,\mathrm{EllipticPi}\left[-1,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$120\,a\,b^2\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$90\,a^2\,b\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$24\,b^3\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$48\,A\,b^3\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+120\,a\,b^2\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+90\,a^2\,b\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$24\,b^3\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+(a+b)\left(24\,a^2\,B-12\,b^2\,B+a\,b\,(56\,A-27\,C)\right)\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-$$

$$2\left(4\,a^2\,b\,(7\,A+9\,B-9\,C)-6\,b^3\,(2\,A+C)+3\,a\,b^2\,(12\,A-12\,B+C)+4\,a^3\,(A+3\,(B+C))\right)\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\Big/$$

$$\left(12\,d\,\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right)+$$

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\left(\frac{2}{3}a\,(7\,A\,b+3\,a\,B)\,\text{Sin}[c+d\,x]+\frac{1}{4}b^2\,C\,\text{Sin}[2\,(c+d\,x)]+\frac{2}{3}a^2\,A\,\text{Tan}[c+d\,x]\right)$$

## Problem 1522: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\text{Cos}[c+d\,x])^{5/2}\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{3/2}\,dx$$

Optimal (type 4, 707 leaves, 10 steps):

$$-\frac{1}{24\,a\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\sqrt{a+b}\left(54\,a\,b\,B-a^2\,(48\,A-33\,C)+8\,b^2\,(3\,A+2\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{24\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\left(a^2\,(48\,A-48\,B-33\,C)-4\,b^2\,(6\,A+3\,B+4\,C)-2\,a\,b\,(72\,A+27\,B+13\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{8\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\left(30\,a^2\,b\,B+8\,b^3\,B+5\,a^3\,C+20\,a\,b^2\,(2\,A+C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{b\,(8\,a\,A-2\,b\,B-3\,a\,C)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,d\,\sqrt{\text{Sec}[c+d\,x]}}-\frac{b\,(6\,A-C)\,(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{3\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{\left(54\,a\,b\,B-a^2\,(48\,A-33\,C)+8\,b^2\,(3\,A+2\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{24\,d}+\frac{2\,A\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{d}$$

Result (type 4, 1940 leaves):

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\left(\frac{1}{12}\left(24\,a^2\,A+b^2\,C\right)\text{Sin}[c+d\,x]+\frac{1}{24}b\,(6\,b\,B+13\,a\,C)\,\text{Sin}[2\,(c+d\,x)]+\frac{1}{12}b^2\,C\,\text{Sin}[3\,(c+d\,x)]\right)+$$

$$\Big(48\,a^3\,A\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+48\,a^2\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-24\,a\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-24\,A\,b^3\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-54\,a^2\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-$$

$$54\,a\,b^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-33\,a^3\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-33\,a^2\,b\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-16\,a\,b^2\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-16\,b^3\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-$$

$$96\,a^2\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+48\,A\,b^3\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+108\,a\,b^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+66\,a^2\,b\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+32\,b^3\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-$$

$$48\,a^3\,A\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+48\,a^2\,A\,b\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+24\,a\,A\,b^2\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-24\,A\,b^3\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+54\,a^2\,b\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-$$

$$54\,a\,b^2\,B\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+33\,a^3\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-33\,a^2\,b\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+16\,a\,b^2\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-16\,b^3\,C\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+$$

$$240\,a\,A\,b^2\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+$$

$$180\,a^2\,b\,B\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+$$

$$48\,b^3\,B\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+$$

$$30\,a^3\,C\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+$$

$$120\,a\,b^2\,C\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+$$

$$240\,a\,A\,b^2\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2\,\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+180\,a^2\,b\,B\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2$$

$$\sqrt{1-\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2-b\,\mathrm{Tan}\big[\frac{1}{2}\,(c+d\,x)\big]^2}{a+b}}+48\,b^3\,B\,\mathrm{EllipticPi}\Big[-1,\,-\mathrm{ArcSin}\Big[\mathrm{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$30\, a^3\, C\, \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right] \text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} + 120\, a\, b^2\, C\, \text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2 \sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} +$$

$$(a+b)\left(-54\, a\, b\, B+a^2 (48 A-33 C)-8 b^2 (3 A+2 C)\right) \text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}} -$$

$$2\left(-12 b^3 B+24 a^3 (A+B-C)+a^2 b (72 A-72 B+13 C)-2 a b^2 (36 A-3 B+19 C)\right) \text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2} \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\right) \Big/$$

$$\left(24\, d \sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}} \left(-1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right) \left(1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)^{3/2} \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right)$$

- **Problem 1524: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{(a+b\,\text{Cos}[c+d x])^{5/2} \left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right)}{\sqrt{\text{Sec}[c+d x]}}\, dx$$

Optimal (type 4, 894 leaves, 11 steps) :

$$-\frac{1}{1920\,a\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+256\,b^4\,(5\,A+4\,C)+12\,a^2\,b^2\,(220\,A+141\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{1920\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\,\left(45\,a^4\,C-30\,a^3\,b\,(5\,B+C)-16\,b^4\,(80\,A+45\,B+64\,C)-8\,a\,b^3\,(260\,A+355\,B+193\,C)-4\,a^2\,b^2\,(660\,A+295\,B+423\,C)\right)$$

$$\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{128\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(10\,a^4\,b\,B-240\,a^2\,b^3\,B-96\,b^5\,B-3\,a^5\,C-40\,a^3\,b^2\,(2\,A+C)-80\,a\,b^4\,(4\,A+3\,C)\right)\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{\left(50\,a^2\,b\,B+120\,b^3\,B-15\,a^3\,C+4\,a\,b^2\,(60\,A+43\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{320\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{\left(80\,A\,b^2+50\,a\,b\,B-15\,a^2\,C+64\,b^2\,C\right)(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sin}[c+d\,x]}{240\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{(10\,b\,B-3\,a\,C)\,(a+b\,\text{Cos}[c+d\,x])^{5/2}\,\text{Sin}[c+d\,x]}{40\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{C\,(a+b\,\text{Cos}[c+d\,x])^{7/2}\,\text{Sin}[c+d\,x]}{5\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{1}{1920\,b^2\,d}$$

$$\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+256\,b^4\,(5\,A+4\,C)+12\,a^2\,b^2\,(220\,A+141\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]$$

Result (type 4, 803 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\sqrt{\mathrm{Sec}[c+d\,x]}$$

$$\left(\frac{1}{960}\left(80\,A\,b^2+170\,a\,b\,B+93\,a^2\,C+88\,b^2\,C\right)\mathrm{Sin}[c+d\,x]+\frac{\left(1040\,a\,A\,b^2+590\,a^2\,b\,B+480\,b^3\,B+15\,a^3\,C+1024\,a\,b^2\,C\right)\mathrm{Sin}[2\,(c+d\,x)]}{1920\,b}+\right.$$

$$\left.\frac{1}{960}\left(80\,A\,b^2+170\,a\,b\,B+93\,a^2\,C+100\,b^2\,C\right)\mathrm{Sin}[3\,(c+d\,x)]+\frac{1}{320}\,b\,(10\,b\,B+21\,a\,C)\,\mathrm{Sin}[4\,(c+d\,x)]+\frac{1}{80}\,b^2\,C\,\mathrm{Sin}[5\,(c+d\,x)]\right)+$$

$$\frac{1}{1920\,b^2\,d\,\sqrt{\frac{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(\left(150\,a^3\,b\,B+2840\,a\,b^3\,B-45\,a^4\,C+256\,b^4\,(5\,A+4\,C)+12\,a^2\,b^2\,(220\,A+141\,C)\right)\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\right.$$

$$\frac{1}{\sqrt{\frac{a-b}{a+b}}\left(a-a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^4+b\left(-1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^2\right)}$$

$$i\left((a-b)\left(-150\,a^3\,b\,B-2840\,a\,b^3\,B+45\,a^4\,C-256\,b^4\,(5\,A+4\,C)-12\,a^2\,b^2\,(220\,A+141\,C)\right)\mathrm{EllipticE}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\right.\right.$$

$$\left.-\frac{a+b}{a-b}\right]-2\,(a-b)\left(-720\,b^4\,B-30\,a^3\,b\,(5\,B-C)+45\,a^4\,C-4\,a^2\,b^2\,(180\,A+185\,B+129\,C)-8\,a\,b^3\,(220\,A+45\,B+161\,C)\right)$$

$$\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+30\left(-10\,a^4\,b\,B+240\,a^2\,b^3\,B+96\,b^5\,B+3\,a^5\,C+\right.$$

$$\left.\left.40\,a^3\,b^2\,(2\,A+C)+80\,a\,b^4\,(4\,A+3\,C)\right)\mathrm{EllipticPi}\left[\frac{a+b}{a-b},i\,\mathrm{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\right)$$

$$\left.\left(-1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)$$

- **Problem 1525: Attempted integration timed out after 120 seconds.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{9/2}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 506 leaves, 7 steps) :

$$-\frac{1}{105\,a^5\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(48\,A\,b^3-63\,a^3\,B-56\,a\,b^2\,B+a^2\,(44\,A\,b+70\,b\,C)\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{1}{105\,a^4\,d\,\sqrt{\text{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,\left(48\,A\,b^3-4\,a\,b^2\,(3\,A+14\,B)+a^3\,(25\,A-63\,B+35\,C)+2\,a^2\,b\,(22\,A+7\,(B+5\,C))\right)\,\sqrt{\text{Cos}[c+d\,x]}$$

$$\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+$$

$$\frac{2\,\left(24\,A\,b^2-28\,a\,b\,B+5\,a^2\,(5\,A+7\,C)\right)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{105\,a^3\,d}-$$

$$\frac{2\,(6\,A\,b-7\,a\,B)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{35\,a^2\,d}+\frac{2\,A\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{7/2}\,\text{Sin}[c+d\,x]}{7\,a\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1526: Attempted integration timed out after 120 seconds.**

$$\int \frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}}{\sqrt{a+b\,\text{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 412 leaves, 6 steps) :

$$\frac{1}{15\,a^4\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,\left(8\,A\,b^2-10\,a\,b\,B+3\,a^2\,(3\,A+5\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}$$

$$\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{1}{15\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,\sqrt{a+b}\,\left(8\,A\,b^2-2\,a\,b\,(A+5\,B)+a^2\,(9\,A-5\,B+15\,C)\right)\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}-$$

$$\frac{2\,(4\,A\,b-5\,a\,B)\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{15\,a^2\,d}+\frac{2\,A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{5/2}\,\mathrm{Sin}[c+d\,x]}{5\,a\,d}$$

Result (type 1, 1 leaves) :

???

### Problem 1527: Unable to integrate problem.

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{5/2}}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

Optimal (type 4, 333 leaves, 5 steps) :

$$-\frac{1}{3\,a^3\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}2\,(a-b)\,\sqrt{a+b}\,(2\,A\,b-3\,a\,B)\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]$$

$$\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{1}{3\,a^2\,d\,\sqrt{\mathrm{Sec}[c+d\,x]}}$$

$$2\,\sqrt{a+b}\,(2\,A\,b+a\,(A-3\,B+3\,C))\,\sqrt{\mathrm{Cos}[c+d\,x]}\,\mathrm{Csc}[c+d\,x]\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\mathrm{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\mathrm{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\mathrm{Sec}[c+d\,x])}{a-b}}+\frac{2\,A\,\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}\,\mathrm{Sec}[c+d\,x]^{3/2}\,\mathrm{Sin}[c+d\,x]}{3\,a\,d}$$

Result (type 8, 47 leaves) :

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2\right)\,\mathrm{Sec}[c+d\,x]^{5/2}}{\sqrt{a+b\,\mathrm{Cos}[c+d\,x]}}\,dx$$

### Problem 1530: Result more than twice size of optimal antiderivative.

$$\int \frac{A + B\,\text{Cos}[c+d\,x] + C\,\text{Cos}[c+d\,x]^2}{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 545 leaves, 8 steps):

$$-\frac{1}{4\,a\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}(a-b)\,\sqrt{a+b}\,(4\,b\,B-3\,a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,(3\,a\,C-2\,b\,(2\,B+C))\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,-\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{1}{4\,b^3\,d\,\sqrt{\text{Sec}[c+d\,x]}}\sqrt{a+b}\,\left(8\,A\,b^2-4\,a\,b\,B+3\,a^2\,C+4\,b^2\,C\right)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\Big[\frac{a+b}{b},\,\text{ArcSin}\Big[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\Big],\,\frac{a+b}{a-b}\Big]\,\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}+\frac{C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sin}[c+d\,x]}{2\,b\,d\,\sqrt{\text{Sec}[c+d\,x]}}+\frac{(4\,b\,B-3\,a\,C)\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{4\,b^2\,d}$$

Result (type 4, 1376 leaves):

$$\frac{C\,\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[2\,(c+d\,x)]}{4\,b\,d}+\Bigg(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\Bigg(-4\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]-4\,b^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+3\,a^2\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+3\,a\,b\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]+8\,b^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3-6\,a\,b\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^3+4\,a\,b\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-4\,b^2\,B\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5-3\,a^2\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+3\,a\,b\,C\,\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^5+$$

$$16\,A\,b^2\,\text{EllipticPi}\Big[-1,\,-\text{ArcSin}\Big[\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]\Big],\,\frac{-a+b}{a+b}\Big]\,\sqrt{1-\text{Tan}\Big[\frac{1}{2}\,(c+d\,x)\Big]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\,-$$

$$8\,a\,b\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$6\,a^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$8\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$16\,A\,b^2\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-8\,a\,b\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$6\,a^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+8\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$(a+b)\,(-4\,b\,B+3\,a\,C)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+2\,b\,(4\,A\,b-a\,C+2\,b\,C)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}\Bigg)\Bigg)\Bigg/$$

$$\left(4 b^2 d\sqrt{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\left(b\left(-1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)-a\left(1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\right)\right)\right)$$

- **Problem 1531: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\operatorname{Cos}[c+d x]+C\operatorname{Cos}[c+d x]^2}{\sqrt{a+b\operatorname{Cos}[c+d x]}\operatorname{Sec}[c+d x]^{3/2}}\,dx$$

Optimal (type 4, 653 leaves, 9 steps):

$$-\frac{1}{24 a b^3 d\sqrt{\operatorname{Sec}[c+d x]}}(a-b)\sqrt{a+b}\left(24 A b^2-18 a b B+15 a^2 C+16 b^2 C\right)\sqrt{\operatorname{Cos}[c+d x]}$$

$$\operatorname{Csc}[c+d x]\operatorname{EllipticE}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}+$$

$$\frac{1}{24 b^3 d\sqrt{\operatorname{Sec}[c+d x]}}\sqrt{a+b}\left(24 A b^2-18 a b B+12 b^2 B+15 a^2 C-10 a b C+16 b^2 C\right)\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Csc}[c+d x]$$

$$\operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}-\frac{1}{8 b^4 d\sqrt{\operatorname{Sec}[c+d x]}}$$

$$\sqrt{a+b}\left(6 a^2 b B+8 b^3 B-5 a^3 C-4 a b^2(2 A+C)\right)\sqrt{\operatorname{Cos}[c+d x]}\operatorname{Csc}[c+d x]\operatorname{EllipticPi}\left[\frac{a+b}{b},\operatorname{ArcSin}\left[\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}}{\sqrt{a+b}\sqrt{\operatorname{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a(1-\operatorname{Sec}[c+d x])}{a+b}}\sqrt{\frac{a(1+\operatorname{Sec}[c+d x])}{a-b}}+\frac{C\sqrt{a+b\operatorname{Cos}[c+d x]}\operatorname{Sin}[c+d x]}{3 b d\operatorname{Sec}[c+d x]^{3/2}}+$$

$$\frac{(6 b B-5 a C)\sqrt{a+b\operatorname{Cos}[c+d x]}\operatorname{Sin}[c+d x]}{12 b^2 d\sqrt{\operatorname{Sec}[c+d x]}}+\frac{\left(24 A b^2-18 a b B+15 a^2 C+16 b^2 C\right)\sqrt{a+b\operatorname{Cos}[c+d x]}\sqrt{\operatorname{Sec}[c+d x]}\operatorname{Sin}[c+d x]}{24 b^3 d}$$

Result (type 4, 1837 leaves):

$$\frac{\sqrt{a+b\operatorname{Cos}[c+d x]}\sqrt{\operatorname{Sec}[c+d x]}\left(\frac{C\operatorname{Sin}[c+d x]}{12 b}+\frac{(6 b B-5 a C)\operatorname{Sin}[2(c+d x)]}{24 b^2}+\frac{C\operatorname{Sin}[3(c+d x)]}{12 b}\right)}{d}-$$

$$\left(\sqrt{\frac{1}{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{1+\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}}\right.$$

$$\left(24 a A b^2\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+24 A b^3\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-18 a^2 b B\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-18 a b^2 B\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+15 a^3 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+\right.$$

$$15 a^2 b C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+16 a b^2 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]+16 b^3 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]-48 A b^3\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3+36 a b^2 B\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3-$$

$$30 a^2 b C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3-32 b^3 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^3-24 a A b^2\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+24 A b^3\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+18 a^2 b B\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-$$

$$18 a b^2 B\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-15 a^3 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+15 a^2 b C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5-16 a b^2 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+16 b^3 C\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^5+$$

$$48 a A b^2\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$36 a^2 b B\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-$$

$$48 b^3 B\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$30 a^3 C\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$24 a b^2 C\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}+$$

$$48 a A b^2\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2\sqrt{1-\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}$$

$$\sqrt{\frac{a+b+a\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2-b\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2}{a+b}}-36 a^2 b B\operatorname{EllipticPi}\left[-1,-\operatorname{ArcSin}\left[\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]\right],\frac{-a+b}{a+b}\right]\operatorname{Tan}\left[\frac{1}{2}(c+d x)\right]^2$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-48\,b^3\,B\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$30\,a^3\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+24\,a\,b^2\,C\,\text{EllipticPi}\left[-1,\,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\,\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+$$

$$(a+b)\,\left(24\,A\,b^2-18\,a\,b\,B+15\,a^2\,C+16\,b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\,\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}-2\,b\,\left(12\,b^2\,B+5\,a^2\,C+2\,a\,b\,(-3\,B+C)\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\right)\right)\Big/$$

$$\left(24\,b^3\,d\,\sqrt{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\,\left(b\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-a\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 1533: Attempted integration timed out after 120 seconds.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{7/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 585 leaves, 7 steps) :

$$-\left(2\left(48\,A\,b^4+25\,a^3\,b\,B-40\,a\,b^3\,B-6\,a^2\,b^2\,(4\,A-5\,C)-3\,a^4\,(3\,A+5\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(15\,a^5\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-$$

$$\left(2\left(48\,A\,b^3+4\,a\,b^2\,(9\,A-10\,B)+6\,a^2\,b\,(2\,A-5\,B+5\,C)+a^3\,(9\,A-5\,B+15\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\right.$$

$$\left.\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(15\,a^4\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\frac{2\left(24\,A\,b^3+5\,a^3\,B-20\,a\,b^2\,B-a^2\,(9\,A\,b-15\,b\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{3/2}\,\text{Sin}[c+d\,x]}{15\,a^3\,\left(a^2-b^2\right)\,d}+$$

$$\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{a\,\left(a^2-b^2\right)\,d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}-$$

$$\frac{2\left(6\,A\,b^2-5\,a\,b\,B-a^2\,(A-5\,C)\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\text{Sec}[c+d\,x]^{5/2}\,\text{Sin}[c+d\,x]}{5\,a^2\,\left(a^2-b^2\right)\,d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1534: Attempted integration timed out after 120 seconds.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 464 leaves, 6 steps) :

$$\left(2\left(8 A b^3+3 a^3 B-6 a b^2 B-a^2 (5 A b-3 b C)\right)\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\right.$$
$$\left.\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(3 a^4\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)+$$
$$\left(2\left(8 A b^2+6 a b (A-B)+a^2 (A-3 B+3 C)\right)\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\ \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(3 a^3\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)+$$
$$\frac{2\left(A b^2-a (b B-a C)\right)\mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{a\left(a^2-b^2\right) d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}-\frac{2\left(4 A b^2-3 a b B-a^2 (A-3 C)\right)\sqrt{a+b\,\mathrm{Cos}[c+d x]}\ \mathrm{Sec}[c+d x]^{3/2}\,\mathrm{Sin}[c+d x]}{3 a^2\left(a^2-b^2\right) d}$$

Result (type 1, 1 leaves) :

???

- **Problem 1535: Attempted integration timed out after 120 seconds.**

$$\int\frac{\left(A+B\,\mathrm{Cos}[c+d x]+C\,\mathrm{Cos}[c+d x]^2\right)\mathrm{Sec}[c+d x]^{3/2}}{(a+b\,\mathrm{Cos}[c+d x])^{3/2}}\,dx$$

Optimal (type 4, 362 leaves, 5 steps) :

$$-\left(2\left(2 A b^2-a b B-a^2 (A-C)\right)\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\right.$$
$$\left.\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(a^3\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)-$$
$$\left(2\left(2 A b+a (A-B-C)\right)\sqrt{\mathrm{Cos}[c+d x]}\ \mathrm{Csc}[c+d x]\ \mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\mathrm{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a(1-\mathrm{Sec}[c+d x])}{a+b}}\right.$$
$$\left.\sqrt{\frac{a(1+\mathrm{Sec}[c+d x])}{a-b}}\right)\Big/\left(a^2\sqrt{a+b}\ d\sqrt{\mathrm{Sec}[c+d x]}\right)+\frac{2\left(A b^2-a (b B-a C)\right)\sqrt{\mathrm{Sec}[c+d x]}\ \mathrm{Sin}[c+d x]}{a\left(a^2-b^2\right) d\sqrt{a+b\,\mathrm{Cos}[c+d x]}}$$

Result (type 1, 1 leaves):

???

### ▪ Problem 1536: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\sqrt{\text{Sec}[c+d\,x]}}{(a+b\,\text{Cos}[c+d\,x])^{3/2}}\,dx$$

Optimal (type 4, 496 leaves, 7 steps):

$$\left(2\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a^2\,b\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)+$$
$$\left(2\,(A\,b+b\,B-a\,C)\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\right.$$
$$\left.\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\,\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\right)\Big/\left(a\,b\,\sqrt{a+b}\,d\,\sqrt{\text{Sec}[c+d\,x]}\right)-\frac{1}{b^2\,d\,\sqrt{\text{Sec}[c+d\,x]}}$$
$$2\,\sqrt{a+b}\,C\,\sqrt{\text{Cos}[c+d\,x]}\,\text{Csc}[c+d\,x]\,\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\,\sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}$$
$$\sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\sqrt{\text{Sec}[c+d\,x]}\,\text{Sin}[c+d\,x]}{b\left(a^2-b^2\right)d\,\sqrt{a+b\,\text{Cos}[c+d\,x]}}$$

Result (type 4, 1141 leaves):

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}\left(\frac{2\left(A\,b^2-a\,b\,B+a^2\,C\right)\text{Sin}[c+d\,x]}{a\,b\left(a^2-b^2\right)}+\frac{2\left(A\,b^2\,\text{Sin}[c+d\,x]-a\,b\,B\,\text{Sin}[c+d\,x]+a^2\,C\,\text{Sin}[c+d\,x]\right)}{b\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d\,x])}\right)}{d}-$$
$$\left(2\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\left(a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+a^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+\right.\right.$$
$$a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+2\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-2\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$A\,b^3\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+a^2\,b\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-a\,b^2\,B\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-a^3\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+a^2\,b\,C\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$2\,a^3\,C\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$2\,a\,b^2\,C\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$2\,a^3\,C\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-2\,a\,b^2\,C\,\mathrm{EllipticPi}\left[-1,\,-\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$(a+b)\,\left(A\,b^2+a\,(-b\,B+a\,C)\right)\,\mathrm{EllipticE}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-a\,b\,(a+b)\,(A-B+C)\,\mathrm{EllipticF}\left[\mathrm{ArcSin}\left[\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\,\frac{-a+b}{a+b}\right]$$

$$\left.\left.\sqrt{1-\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}\right)\right)\Bigg/$$

$$\left(b\,\left(a^3-a\,b^2\right)\,d\,\left(1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)^{3/2}\sqrt{\frac{a+b+a\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\mathrm{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}\right)$$

- **Problem 1537: Result more than twice size of optimal antiderivative.**

$$\int\frac{A+B\,\mathrm{Cos}[c+d\,x]+C\,\mathrm{Cos}[c+d\,x]^2}{(a+b\,\mathrm{Cos}[c+d\,x])^{3/2}\,\sqrt{\mathrm{Sec}[c+d\,x]}}\,dx$$

Optimal (type 4, 595 leaves, 8 steps):

$$-\Bigg(\left(2\,A\,b^2-2\,a\,b\,B+3\,a^2\,C-b^2\,C\right)\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]$$

$$\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\Bigg)\Big/\left(a\,b^2\sqrt{a+b}\ d\sqrt{\text{Sec}[c+d\,x]}\right)+$$

$$\Bigg(\left(2\,A\,b^2-a\,(b\,(2\,B-C)-3\,a\,C)\right)\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}\Bigg)\Big/\left(a\,b^2\sqrt{a+b}\ d\sqrt{\text{Sec}[c+d\,x]}\right)-\frac{1}{b^3\,d\sqrt{\text{Sec}[c+d\,x]}}$$

$$\sqrt{a+b}\ (2\,b\,B-3\,a\,C)\sqrt{\text{Cos}[c+d\,x]}\ \text{Csc}[c+d\,x]\ \text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d\,x]}}\right],-\frac{a+b}{a-b}\right]$$

$$\sqrt{\frac{a\,(1-\text{Sec}[c+d\,x])}{a+b}}\ \sqrt{\frac{a\,(1+\text{Sec}[c+d\,x])}{a-b}}-\frac{2\left(A\,b^2-a\,(b\,B-a\,C)\right)\text{Sin}[c+d\,x]}{b\left(a^2-b^2\right)d\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}}+$$

$$\frac{\left(2\,A\,b^2-2\,a\,b\,B+3\,a^2\,C-b^2\,C\right)\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}\ \text{Sin}[c+d\,x]}{b^2\left(a^2-b^2\right)d}$$

Result (type 4, 1683 leaves) :

$$\frac{\sqrt{a+b\,\text{Cos}[c+d\,x]}\ \sqrt{\text{Sec}[c+d\,x]}\left(\frac{2\left(A\,b^2-a\,b\,B+a^2\,C\right)\text{Sin}[c+d\,x]}{b^2\left(-a^2+b^2\right)}-\frac{2\left(a\,A\,b^2\,\text{Sin}[c+d\,x]-a^2\,b\,B\,\text{Sin}[c+d\,x]+a^3\,C\,\text{Sin}[c+d\,x]\right)}{b^2\left(-a^2+b^2\right)(a+b\,\text{Cos}[c+d\,x])}\right)}{d}-$$

$$\left(\sqrt{\frac{1}{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\ \sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}}\right.$$

$$\Bigg(-2\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+2\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+2\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-3\,a^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]-$$

$$3\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+a\,b^2\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]+4\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-4\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+$$

$$6\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3-2\,b^3\,C\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^3+2\,a\,A\,b^2\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-2\,A\,b^3\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5-2\,a^2\,b\,B\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^5+$$

$$2\,a\,b^2\,B\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+3\,a^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-3\,a^2\,b\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5-a\,b^2\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+b^3\,C\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^5+$$

$$4\,a^2\,b\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$4\,b^3\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$6\,a^3\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$6\,a\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+$$

$$4\,a^2\,b\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-4\,b^3\,B\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$6\,a^3\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}+6\,a\,b^2\,C\,\text{EllipticPi}\left[-1,-\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}-$$

$$(a+b)\,\left(2\,A\,b^2-2\,a\,b\,B+3\,a^2\,C-b^2\,C\right)\,\text{EllipticE}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\left(1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)$$

$$\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}+2\,b\,(a+b)\,(A\,b-b\,B+a\,C)\,\text{EllipticF}\left[\text{ArcSin}\left[\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]\right],\frac{-a+b}{a+b}\right]$$

$$\sqrt{1-\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}{a+b}}\Bigg)\Bigg)\Bigg/$$

$$\left(b^2\left(-a^2+b^2\right)d\sqrt{1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2}\left(b\left(-1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)-a\left(1+\text{Tan}\left[\frac{1}{2}(c+d\,x)\right]^2\right)\right)\right)$$

- **Problem 1538: Result unnecessarily involves imaginary or complex numbers.**

$$\int\frac{A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2}{(a+b\,\text{Cos}[c+d\,x])^{3/2}\,\text{Sec}[c+d\,x]^{3/2}}\,dx$$

Optimal (type 4, 720 leaves, 9 steps) :

$$-\left(\left(12 a^2 b B-4 b^3 B-a b^2 (8 A-7 C)-15 a^3 C\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\right.$$

$$\left.\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(4 a b^3 \sqrt{a+b}\ d \sqrt{\text{Sec}[c+d x]}\right)-$$

$$\left(\left(8 A b^2-a b (12 B-5 C)+15 a^2 C-2 b^2 (2 B+C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(4 b^3 \sqrt{a+b}\ d \sqrt{\text{Sec}[c+d x]}\right)-$$

$$\frac{1}{4 b^4 d \sqrt{\text{Sec}[c+d x]}} \sqrt{a+b}\ \left(8 A b^2-12 a b B+15 a^2 C+4 b^2 C\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]$$

$$\text{EllipticPi}\left[\frac{a+b}{b},\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}-$$

$$\frac{2 \left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{b \left(a^2-b^2\right) d \sqrt{a+b \text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{3/2}}+\frac{\left(4 A b^2-4 a b B+5 a^2 C-b^2 C\right) \sqrt{a+b \text{Cos}[c+d x]}\ \text{Sin}[c+d x]}{2 b^2 \left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}}+$$

$$\frac{\left(12 a^2 b B-4 b^3 B-a b^2 (8 A-7 C)-15 a^3 C\right) \sqrt{a+b \text{Cos}[c+d x]} \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{4 b^3 \left(a^2-b^2\right) d}$$

Result (type 4, 656 leaves) :

$$\frac{1}{d}\sqrt{a+b\,\text{Cos}[c+d\,x]}\,\sqrt{\text{Sec}[c+d\,x]}$$

$$\left(\frac{2\,a\,\left(A\,b^2-a\,b\,B+a^2\,C\right)\,\text{Sin}[c+d\,x]}{b^3\,\left(a^2-b^2\right)}+\frac{2\,\left(a^2\,A\,b^2\,\text{Sin}[c+d\,x]-a^3\,b\,B\,\text{Sin}[c+d\,x]+a^4\,C\,\text{Sin}[c+d\,x]\right)}{b^3\,\left(-a^2+b^2\right)\,\left(a+b\,\text{Cos}[c+d\,x]\right)}+\frac{C\,\text{Sin}[2\,(c+d\,x)]}{4\,b^2}\right)+$$

$$\frac{1}{4\,b^3\,\left(a^2-b^2\right)\,d\,\sqrt{\frac{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}}\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{1+\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}}$$

$$\left(-\left(-12\,a^2\,b\,B+4\,b^3\,B+a\,b^2\,(8\,A-7\,C)+15\,a^3\,C\right)\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]+\frac{1}{\sqrt{1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}\,\sqrt{\frac{a+b+a\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2-b\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2}{a+b}}}\right.$$

$$i\,\sqrt{\frac{a-b}{a+b}}\,\left(\left(-12\,a^2\,b\,B+4\,b^3\,B+a\,b^2\,(8\,A-7\,C)+15\,a^3\,C\right)\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]-\right.$$

$$2\,\left(-2\,a^2\,b\,(6\,B-5\,C)+15\,a^3\,C+2\,b^3\,(2\,A+C)+a\,b^2\,(8\,A-8\,B+C)\right)\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]+$$

$$\left.\left.2\,(a+b)\,\left(8\,A\,b^2-12\,a\,b\,B+15\,a^2\,C+4\,b^2\,C\right)\,\text{EllipticPi}\left[\frac{a+b}{a-b},i\,\text{ArcSinh}\left[\sqrt{\frac{a-b}{a+b}}\,\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]\right],-\frac{a+b}{a-b}\right]\right)\,\left(-1-\text{Tan}\left[\frac{1}{2}\,(c+d\,x)\right]^2\right)\right)$$

- **Problem 1539: Attempted integration timed out after 120 seconds.**

$$\int\frac{\left(A+B\,\text{Cos}[c+d\,x]+C\,\text{Cos}[c+d\,x]^2\right)\,\text{Sec}[c+d\,x]^{5/2}}{(a+b\,\text{Cos}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 660 leaves, 7 steps) :

$$-\left(2\left(16 A b^5-3 a^5 B+15 a^3 b^2 B-8 a b^4 B-2 a^2 b^3 (14 A-C)+a^4 (8 A b-6 b C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3 a^5 \sqrt{a+b} \left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}\right) -$$

$$\left(2\left(16 A b^4+4 a b^3 (3 A-2 B)-3 a^3 b (3 A-3 B-C)-2 a^2 b^2 (8 A+3 B-C)-a^4 (A-3 B+3 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b \text{Cos}[c+d x]}}{\sqrt{a+b} \sqrt{\text{Cos}[c+d x]}}\right], -\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right) \Big/$$

$$\left(3 a^4 \sqrt{a+b} \left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}\right) + \frac{2\left(A b^2-a (b B-a C)\right) \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d (a+b \text{Cos}[c+d x])^{3/2}} +$$

$$\frac{2\left(10 a^2 A b^2-6 A b^4-7 a^3 b B+3 a b^3 B+4 a^4 C\right) \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \sqrt{a+b \text{Cos}[c+d x]}} + \frac{1}{3 a^3 \left(a^2-b^2\right)^2 d}$$

$$2\left(8 A b^4+8 a^3 b B-4 a b^3 B+a^4 (A-5 C)-a^2 b^2 (13 A-C)\right) \sqrt{a+b \text{Cos}[c+d x]}\ \text{Sec}[c+d x]^{3/2} \text{Sin}[c+d x]$$

Result (type 1, 1 leaves) :

???

## ■ Problem 1540: Attempted integration timed out after 120 seconds.

$$\int \frac{\left(A+B \text{Cos}[c+d x]+C \text{Cos}[c+d x]^2\right) \text{Sec}[c+d x]^{3/2}}{(a+b \text{Cos}[c+d x])^{5/2}} \, dx$$

Optimal (type 4, 535 leaves, 6 steps) :

$$\left(2\left(8 A b^4+6 a^3 b B-2 a b^3 B+3 a^4 (A-C)-a^2 b^2 (15 A+C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right)\Big/\left(3 a^4 \sqrt{a+b}\ \left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}\right)+$$

$$\left(2\left(8 A b^3+2 a b^2 (3 A-B)-3 a^3 (A-B-C)-a^2 b (9 A+3 B+C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right]\right.$$

$$\left.\sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}}\ \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right)\Big/\left(3 a^3 \sqrt{a+b}\ \left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}\right)+$$

$$\frac{2\left(A b^2-a (b B-a C)\right) \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d (a+b\,\text{Cos}[c+d x])^{3/2}}-\frac{2\left(4 A b^4+5 a^3 b B-a b^3 B-2 a^4 C-2 a^2 b^2 (4 A+C)\right) \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{3 a^2 \left(a^2-b^2\right)^2 d \sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 1, 1 leaves) :

???

## Problem 1541: Unable to integrate problem.

$$\int \frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^{5/2}}\, dx$$

Optimal (type 4, 495 leaves, 6 steps) :

$$-\left(2\left(2 A b^3+3 a^3 B+a b^2 B-2 a^2 b (3 A+2 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3 a^3 (a-b) (a+b)^{3/2} d \sqrt{\text{Sec}[c+d x]}\right) -$$

$$\left(2\left(2 A b^2-a^2 (3 A+3 B+C)+a b (3 A+B+3 C)\right) \sqrt{\text{Cos}[c+d x]}\ \text{Csc}[c+d x]\ \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{a+b\,\text{Cos}[c+d x]}}{\sqrt{a+b}\ \sqrt{\text{Cos}[c+d x]}}\right],-\frac{a+b}{a-b}\right] \sqrt{\frac{a (1-\text{Sec}[c+d x])}{a+b}} \sqrt{\frac{a (1+\text{Sec}[c+d x])}{a-b}}\right) \Big/ \left(3 a^2 \sqrt{a+b} \left(a^2-b^2\right) d \sqrt{\text{Sec}[c+d x]}\right) +$$

$$\frac{2\left(A b^2-a (b B-a C)\right) \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right) d\, (a+b\,\text{Cos}[c+d x])^{3/2} \sqrt{\text{Sec}[c+d x]}}+\frac{2\left(2 A b^3+3 a^3 B+a b^2 B-2 a^2 b (3 A+2 C)\right) \sqrt{\text{Sec}[c+d x]}\ \text{Sin}[c+d x]}{3 a \left(a^2-b^2\right)^2 d \sqrt{a+b\,\text{Cos}[c+d x]}}$$

Result (type 8, 47 leaves):

$$\int \frac{\left(A+B\,\text{Cos}[c+d x]+C\,\text{Cos}[c+d x]^2\right) \sqrt{\text{Sec}[c+d x]}}{(a+b\,\text{Cos}[c+d x])^{5/2}}\, dx$$

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# Test results for the 98 problems in "4.2.7 (d trig)^m (a+b (c cos)^n)^p.m"

- **Problem 6: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sin}[x]}{a-a\,\text{Cos}[x]^2}\, dx$$

Optimal (type 3, 8 leaves, 2 steps):

$$-\frac{\text{ArcTanh}[\text{Cos}[x]]}{a}$$

Result (type 3, 21 leaves):

$$\frac{-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]}{a}$$

- **Problem 7: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Csc}[x]}{a-a\,\text{Cos}[x]^2}\, dx$$

Optimal (type 3, 22 leaves, 3 steps):

$$-\frac{\text{ArcTanh}[\text{Cos}[x]]}{2\,a}-\frac{\text{Cot}[x]\,\text{Csc}[x]}{2\,a}$$

Result (type 3, 51 leaves):

$$\frac{-\frac{1}{8}\,\text{Csc}\left[\frac{x}{2}\right]^2-\frac{1}{2}\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]+\frac{1}{2}\,\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]+\frac{1}{8}\,\text{Sec}\left[\frac{x}{2}\right]^2}{a}$$

## Problem 9: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Csc}[x]^3}{a-a\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 35 leaves, 4 steps):

$$-\frac{3\,\text{ArcTanh}[\text{Cos}[x]]}{8\,a}-\frac{3\,\text{Cot}[x]\,\text{Csc}[x]}{8\,a}-\frac{\text{Cot}[x]\,\text{Csc}[x]^3}{4\,a}$$

Result (type 3, 75 leaves):

$$\frac{-\frac{3}{32}\,\text{Csc}\left[\frac{x}{2}\right]^2-\frac{1}{64}\,\text{Csc}\left[\frac{x}{2}\right]^4-\frac{3}{8}\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]+\frac{3}{8}\,\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]+\frac{3}{32}\,\text{Sec}\left[\frac{x}{2}\right]^2+\frac{1}{64}\,\text{Sec}\left[\frac{x}{2}\right]^4}{a}$$

## Problem 11: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sin}[x]^5}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 54 leaves, 4 steps):

$$-\frac{(a+b)^2\,\text{ArcTan}\left[\frac{\sqrt{b}\,\text{Cos}[x]}{\sqrt{a}}\right]}{\sqrt{a}\,b^{5/2}}+\frac{(a+2\,b)\,\text{Cos}[x]}{b^2}-\frac{\text{Cos}[x]^3}{3\,b}$$

Result (type 3, 116 leaves):

$$\frac{-\frac{12\,(a+b)^2\,\text{ArcTan}\left[\frac{\sqrt{b}-\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]}{\sqrt{a}}-\frac{12\,(a+b)^2\,\text{ArcTan}\left[\frac{\sqrt{b}+\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]}{\sqrt{a}}+3\,\sqrt{b}\,(4\,a+7\,b)\,\text{Cos}[x]-b^{3/2}\,\text{Cos}[3\,x]}{12\,b^{5/2}}$$

## Problem 12: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sin}[x]^3}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 36 leaves, 3 steps):

$$-\frac{(a+b)\,\text{ArcTan}\left[\frac{\sqrt{b}\,\text{Cos}[x]}{\sqrt{a}}\right]}{\sqrt{a}\,b^{3/2}}+\frac{\text{Cos}[x]}{b}$$

Result (type 3, 90 leaves) :

$$\frac{-(a+b)\,\text{ArcTan}\left[\frac{\sqrt{b}-\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]-(a+b)\,\text{ArcTan}\left[\frac{\sqrt{b}+\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]+\sqrt{a}\,\sqrt{b}\,\text{Cos}[x]}{\sqrt{a}\,b^{3/2}}$$

## Problem 15: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Csc}[x]^3}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 62 leaves, 5 steps) :

$$-\frac{b^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\text{Cos}[x]}{\sqrt{a}}\right]}{\sqrt{a}\,(a+b)^2}-\frac{(a+3\,b)\,\text{ArcTanh}[\text{Cos}[x]]}{2\,(a+b)^2}-\frac{\text{Cot}[x]\,\text{Csc}[x]}{2\,(a+b)}$$

Result (type 3, 140 leaves) :

$$\frac{1}{8\,\sqrt{a}\,(a+b)^2}\left(-8\,b^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{b}-\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]-8\,b^{3/2}\,\text{ArcTan}\left[\frac{\sqrt{b}+\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]+\right.$$
$$\left.\sqrt{a}\left(-(a+b)\,\text{Csc}\left[\frac{x}{2}\right]^2-4\,(a+3\,b)\left(\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]-\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]\right)+(a+b)\,\text{Sec}\left[\frac{x}{2}\right]^2\right)\right)$$

## Problem 16: Result more than twice size of optimal antiderivative.

$$\int\frac{\text{Csc}[x]^5}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 94 leaves, 6 steps) :

$$-\frac{b^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\text{Cos}[x]}{\sqrt{a}}\right]}{\sqrt{a}\,(a+b)^3}-\frac{\left(3\,a^2+10\,a\,b+15\,b^2\right)\,\text{ArcTanh}[\text{Cos}[x]]}{8\,(a+b)^3}-\frac{(3\,a+7\,b)\,\text{Cot}[x]\,\text{Csc}[x]}{8\,(a+b)^2}-\frac{\text{Cot}[x]\,\text{Csc}[x]^3}{4\,(a+b)}$$

Result (type 3, 204 leaves) :

$$\frac{1}{64\sqrt{a}\,(a+b)^3}\left(-64\,b^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}-\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]-64\,b^{5/2}\,\text{ArcTan}\left[\frac{\sqrt{b}+\sqrt{a+b}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a}}\right]+\sqrt{a}\left(-2\,(3a^2+10\,a\,b+7\,b^2)\,\text{Csc}\left[\frac{x}{2}\right]^2-(a+b)^2\,\text{Csc}\left[\frac{x}{2}\right]^4-\right.\right.$$
$$\left.\left.8\,(3a^2+10\,a\,b+15\,b^2)\left(\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]-\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]\right)+2\,(3a^2+10\,a\,b+7\,b^2)\,\text{Sec}\left[\frac{x}{2}\right]^2+(a+b)^2\,\text{Sec}\left[\frac{x}{2}\right]^4\right)\right)$$

- **Problem 32: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sec}[x]}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 41 leaves, 4 steps):

$$\frac{\text{ArcTanh}[\text{Sin}[x]]}{a}-\frac{\sqrt{b}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\text{Sin}[x]}{\sqrt{a+b}}\right]}{a\sqrt{a+b}}$$

Result (type 3, 93 leaves):

$$\frac{-2\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]+2\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]+\frac{\sqrt{b}\left(\text{Log}\left[\sqrt{a+b}-\sqrt{b}\,\text{Sin}[x]\right]-\text{Log}\left[\sqrt{a+b}+\sqrt{b}\,\text{Sin}[x]\right]\right)}{\sqrt{a+b}}}{2\,a}$$

- **Problem 33: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Sec}[x]^3}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 59 leaves, 5 steps):

$$\frac{(a-2\,b)\,\text{ArcTanh}[\text{Sin}[x]]}{2\,a^2}+\frac{b^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\text{Sin}[x]}{\sqrt{a+b}}\right]}{a^2\sqrt{a+b}}+\frac{\text{Sec}[x]\,\text{Tan}[x]}{2\,a}$$

Result (type 3, 152 leaves):

$$\frac{1}{4\,a^2}\left(-2\,(a-2\,b)\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]+2\,(a-2\,b)\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]-\right.$$
$$\left.\frac{2\,b^{3/2}\,\text{Log}\left[\sqrt{a+b}-\sqrt{b}\,\text{Sin}[x]\right]}{\sqrt{a+b}}+\frac{2\,b^{3/2}\,\text{Log}\left[\sqrt{a+b}+\sqrt{b}\,\text{Sin}[x]\right]}{\sqrt{a+b}}+\frac{a}{\left(\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right)^2}-\frac{a}{\left(\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right)^2}\right)$$

## Problem 34: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Sec}[x]^5}{a+b\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 90 leaves, 6 steps):

$$\frac{\left(3 a^2-4 a b+8 b^2\right) \text{ArcTanh}[\text{Sin}[x]]}{8 a^3}-\frac{b^{5/2}\, \text{ArcTanh}\left[\frac{\sqrt{b}\, \text{Sin}[x]}{\sqrt{a+b}}\right]}{a^3 \sqrt{a+b}}+\frac{(3 a-4 b)\, \text{Sec}[x]\, \text{Tan}[x]}{8 a^2}+\frac{\text{Sec}[x]^3\, \text{Tan}[x]}{4 a}$$

Result (type 3, 215 leaves):

$$\frac{1}{16 a^3}\left(-2 \left(3 a^2-4 a b+8 b^2\right) \text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]+2 \left(3 a^2-4 a b+8 b^2\right) \text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]+\frac{8 b^{5/2}\, \text{Log}\left[\sqrt{a+b}-\sqrt{b}\, \text{Sin}[x]\right]}{\sqrt{a+b}}-\frac{8 b^{5/2}\, \text{Log}\left[\sqrt{a+b}+\sqrt{b}\, \text{Sin}[x]\right]}{\sqrt{a+b}}+\frac{a^2}{\left(\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right)^4}-\frac{a^2}{\left(\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right)^4}+\frac{a (-3 a+4 b)}{\left(\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right)^2}+\frac{a (-3 a+4 b)}{-1+\text{Sin}[x]}\right)$$

## Problem 67: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[x]}{\sqrt{1+\text{Cos}[x]^2}}\,dx$$

Optimal (type 3, 9 leaves, 2 steps):

$$\text{ArcSin}\left[\frac{\text{Sin}[x]}{\sqrt{2}}\right]$$

Result (type 3, 19 leaves):

$$\text{ArcTan}\left[\frac{\sqrt{2}\, \text{Sin}[x]}{\sqrt{3+\text{Cos}[2 x]}}\right]$$

## Problem 68: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[5+3 x]}{\sqrt{3+\text{Cos}[5+3 x]^2}}\,dx$$

Optimal (type 3, 15 leaves, 2 steps):

$$\frac{1}{3} \text{ArcSin}\left[\frac{1}{2} \text{Sin}[5+3 x]\right]$$

Result (type 3, 31 leaves):

$$\frac{1}{3}\,\text{ArcTan}\left[\frac{\sqrt{2}\,\text{Sin}[5+3x]}{\sqrt{7+\text{Cos}[2\,(5+3x)]}}\right]$$

- **Problem 69: Result more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cos}[x]}{\sqrt{4-\text{Cos}[x]^2}}\,dx$$

Optimal (type 3, 9 leaves, 2 steps):

$$\text{ArcSinh}\left[\frac{\text{Sin}[x]}{\sqrt{3}}\right]$$

Result (type 3, 21 leaves):

$$\text{ArcTanh}\left[\frac{\sqrt{2}\,\text{Sin}[x]}{\sqrt{7-\text{Cos}[2x]}}\right]$$

- **Problem 70: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{1}{a+b\,\text{Cos}[x]^4}\,dx$$

Optimal (type 3, 487 leaves, 10 steps):

$$\frac{\left(\sqrt{a}+\sqrt{a+b}\right)\text{ArcTan}\left[\frac{a^{1/4}\sqrt{a+b-\sqrt{a}\,\sqrt{a+b}}-\sqrt{2}\,(a+b)^{3/4}\,\text{Cot}[x]}{a^{1/4}\sqrt{a+b+\sqrt{a}\,\sqrt{a+b}}}\right]}{2\sqrt{2}\,a^{3/4}\,(a+b)^{1/4}\sqrt{a+b+\sqrt{a}\,\sqrt{a+b}}}-\frac{\left(\sqrt{a}+\sqrt{a+b}\right)\text{ArcTan}\left[\frac{a^{1/4}\sqrt{a+b-\sqrt{a}\,\sqrt{a+b}}+\sqrt{2}\,(a+b)^{3/4}\,\text{Cot}[x]}{a^{1/4}\sqrt{a+b+\sqrt{a}\,\sqrt{a+b}}}\right]}{2\sqrt{2}\,a^{3/4}\,(a+b)^{1/4}\sqrt{a+b+\sqrt{a}\,\sqrt{a+b}}}-$$

$$\frac{\left(\sqrt{a}-\sqrt{a+b}\right)\text{Log}\left[\sqrt{a}\,(a+b)^{1/4}-\sqrt{2}\,a^{1/4}\sqrt{a+b-\sqrt{a}\,\sqrt{a+b}}\,\text{Cot}[x]+(a+b)^{3/4}\,\text{Cot}[x]^2\right]}{4\sqrt{2}\,a^{3/4}\,(a+b)^{1/4}\sqrt{a+b-\sqrt{a}\,\sqrt{a+b}}}+$$

$$\frac{\left(\sqrt{a}-\sqrt{a+b}\right)\text{Log}\left[\sqrt{a}\,(a+b)^{1/4}+\sqrt{2}\,a^{1/4}\sqrt{a+b-\sqrt{a}\,\sqrt{a+b}}\,\text{Cot}[x]+(a+b)^{3/4}\,\text{Cot}[x]^2\right]}{4\sqrt{2}\,a^{3/4}\,(a+b)^{1/4}\sqrt{a+b-\sqrt{a}\,\sqrt{a+b}}}$$

Result (type 3, 121 leaves):

$$\frac{\text{ArcTan}\left[\frac{\sqrt{a}\,\text{Tan}[x]}{\sqrt{a+i\sqrt{a}\,\sqrt{b}}}\right]}{2\sqrt{a}\,\sqrt{a+i\sqrt{a}\,\sqrt{b}}}-\frac{\text{ArcTanh}\left[\frac{\sqrt{a}\,\text{Tan}[x]}{\sqrt{-a+i\sqrt{a}\,\sqrt{b}}}\right]}{2\sqrt{a}\,\sqrt{-a+i\sqrt{a}\,\sqrt{b}}}$$

## Problem 72: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{1+\text{Cos}[x]^4} \, dx$$

Optimal (type 3, 292 leaves, 10 steps):

$$\frac{x}{2\sqrt{-1+\sqrt{2}}}+\frac{\text{ArcTan}\left[\frac{\left(-2+\sqrt{2}\right)\text{Cos}[x]\,\text{Sin}[x]+\sqrt{-1+\sqrt{2}}\,\left(1-2\,\text{Sin}[x]^2\right)}{2+\sqrt{1+\sqrt{2}}+2\sqrt{-1+\sqrt{2}}\,\text{Cos}[x]\,\text{Sin}[x]+\left(-2+\sqrt{2}\right)\text{Sin}[x]^2}\right]}{4\sqrt{-1+\sqrt{2}}}+\frac{\text{ArcTan}\left[\frac{\left(-2+\sqrt{2}\right)\text{Cos}[x]\,\text{Sin}[x]+\sqrt{-1+\sqrt{2}}\,\left(-1+2\,\text{Sin}[x]^2\right)}{2+\sqrt{1+\sqrt{2}}-2\sqrt{-1+\sqrt{2}}\,\text{Cos}[x]\,\text{Sin}[x]+\left(-2+\sqrt{2}\right)\text{Sin}[x]^2}\right]}{4\sqrt{-1+\sqrt{2}}}+$$

$$\frac{1}{8}\sqrt{-1+\sqrt{2}}\,\text{Log}\left[\sqrt{2}-2\sqrt{-1+\sqrt{2}}\,\text{Cot}[x]+2\,\text{Cot}[x]^2\right]-\frac{1}{8}\sqrt{-1+\sqrt{2}}\,\text{Log}\left[1+\sqrt{2\left(-1+\sqrt{2}\right)}\,\text{Cot}[x]+\sqrt{2}\,\text{Cot}[x]^2\right]$$

Result (type 3, 45 leaves):

$$\frac{\text{ArcTan}\left[\frac{\text{Tan}[x]}{\sqrt{1-i}}\right]}{2\sqrt{1-i}}+\frac{\text{ArcTan}\left[\frac{\text{Tan}[x]}{\sqrt{1+i}}\right]}{2\sqrt{1+i}}$$

## Problem 74: Result is not expressed in closed-form.

$$\int \frac{1}{a+b\,\text{Cos}[x]^5} \, dx$$

Optimal (type 3, 494 leaves, 12 steps):

$$\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}-b^{1/5}}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}+b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-b^{1/5}}\,\sqrt{a^{1/5}+b^{1/5}}}+\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}+(-1)^{1/5}b^{1/5}}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}-(-1)^{1/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{1/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{1/5}b^{1/5}}}+\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}-(-1)^{2/5}b^{1/5}}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}+(-1)^{2/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{2/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{2/5}b^{1/5}}}+$$

$$\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}+(-1)^{3/5}b^{1/5}}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}-(-1)^{3/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{3/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{3/5}b^{1/5}}}+\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}-(-1)^{4/5}b^{1/5}}\,\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}+(-1)^{4/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{4/5}b^{1/5}}\,\sqrt{a^{1/5}+(-1)^{4/5}b^{1/5}}}$$

Result (type 7, 130 leaves):

$$\frac{8}{5}\,\text{RootSum}\left[b+5\,b\,\#1^2+10\,b\,\#1^4+32\,a\,\#1^5+10\,b\,\#1^6+5\,b\,\#1^8+b\,\#1^{10}\,\&,\,\frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^3-i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^3}{b+4\,b\,\#1^2+16\,a\,\#1^3+6\,b\,\#1^4+4\,b\,\#1^6+b\,\#1^8}\,\&\right]$$

## Problem 75: Result is not expressed in closed-form.

$$\int \frac{1}{a+b\,\text{Cos}[x]^6} \, dx$$

Optimal (type 3, 171 leaves, 7 steps):

$$-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}+b^{1/3}}\ \text{Cot}[x]}{a^{1/6}}\right]}{3\,a^{5/6}\sqrt{a^{1/3}+b^{1/3}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}-(-1)^{1/3}b^{1/3}}\ \text{Cot}[x]}{a^{1/6}}\right]}{3\,a^{5/6}\sqrt{a^{1/3}-(-1)^{1/3}b^{1/3}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}+(-1)^{2/3}b^{1/3}}\ \text{Cot}[x]}{a^{1/6}}\right]}{3\,a^{5/6}\sqrt{a^{1/3}+(-1)^{2/3}b^{1/3}}}$$

Result (type 7, 146 leaves):

$$\frac{8}{3}\text{RootSum}\left[b+6\,b\,\#1+15\,b\,\#1^2+64\,a\,\#1^3+20\,b\,\#1^3+15\,b\,\#1^4+6\,b\,\#1^5+b\,\#1^6\,\&,\ \frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[2\,x]}{\text{Cos}[2\,x]-\#1}\right]\#1^2-i\,\text{Log}\left[1-2\,\text{Cos}[2\,x]\,\#1+\#1^2\right]\#1^2}{b+5\,b\,\#1+32\,a\,\#1^2+10\,b\,\#1^2+10\,b\,\#1^3+5\,b\,\#1^4+b\,\#1^5}\,\&\right]$$

- **Problem 76: Result is not expressed in closed-form.**

$$\int\frac{1}{a+b\,\text{Cos}[x]^8}\,dx$$

Optimal (type 3, 245 leaves, 9 steps):

$$\frac{\text{ArcTan}\left[\frac{\sqrt{(-a)^{1/4}-b^{1/4}}\ \text{Cot}[x]}{(-a)^{1/8}}\right]}{4\,(-a)^{7/8}\sqrt{(-a)^{1/4}-b^{1/4}}}+\frac{\text{ArcTan}\left[\frac{\sqrt{(-a)^{1/4}-i\,b^{1/4}}\ \text{Cot}[x]}{(-a)^{1/8}}\right]}{4\,(-a)^{7/8}\sqrt{(-a)^{1/4}-i\,b^{1/4}}}+\frac{\text{ArcTan}\left[\frac{\sqrt{(-a)^{1/4}+i\,b^{1/4}}\ \text{Cot}[x]}{(-a)^{1/8}}\right]}{4\,(-a)^{7/8}\sqrt{(-a)^{1/4}+i\,b^{1/4}}}+\frac{\text{ArcTan}\left[\frac{\sqrt{(-a)^{1/4}+b^{1/4}}\ \text{Cot}[x]}{(-a)^{1/8}}\right]}{4\,(-a)^{7/8}\sqrt{(-a)^{1/4}+b^{1/4}}}$$

Result (type 7, 172 leaves):

$$8\,\text{RootSum}\left[b+8\,b\,\#1+28\,b\,\#1^2+56\,b\,\#1^3+256\,a\,\#1^4+70\,b\,\#1^4+56\,b\,\#1^5+28\,b\,\#1^6+8\,b\,\#1^7+b\,\#1^8\,\&,\right.$$
$$\left.\frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[2\,x]}{\text{Cos}[2\,x]-\#1}\right]\#1^3-i\,\text{Log}\left[1-2\,\text{Cos}[2\,x]\,\#1+\#1^2\right]\#1^3}{b+7\,b\,\#1+21\,b\,\#1^2+128\,a\,\#1^3+35\,b\,\#1^3+35\,b\,\#1^4+21\,b\,\#1^5+7\,b\,\#1^6+b\,\#1^7}\,\&\right]$$

- **Problem 77: Result is not expressed in closed-form.**

$$\int\frac{1}{a-b\,\text{Cos}[x]^5}\,dx$$

Optimal (type 3, 494 leaves, 12 steps):

$$\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}+b^{1/5}}\ \text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}-b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-b^{1/5}}\ \sqrt{a^{1/5}+b^{1/5}}}+\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}-(-1)^{1/5}b^{1/5}}\ \text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}+(-1)^{1/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{1/5}b^{1/5}}\ \sqrt{a^{1/5}+(-1)^{1/5}b^{1/5}}}+\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}+(-1)^{2/5}b^{1/5}}\ \text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}-(-1)^{2/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{2/5}b^{1/5}}\ \sqrt{a^{1/5}+(-1)^{2/5}b^{1/5}}}+$$
$$\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}-(-1)^{3/5}b^{1/5}}\ \text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}+(-1)^{3/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{3/5}b^{1/5}}\ \sqrt{a^{1/5}+(-1)^{3/5}b^{1/5}}}+\frac{2\,\text{ArcTan}\left[\frac{\sqrt{a^{1/5}+(-1)^{4/5}b^{1/5}}\ \text{Tan}\left[\frac{x}{2}\right]}{\sqrt{a^{1/5}-(-1)^{4/5}b^{1/5}}}\right]}{5\,a^{4/5}\sqrt{a^{1/5}-(-1)^{4/5}b^{1/5}}\ \sqrt{a^{1/5}+(-1)^{4/5}b^{1/5}}}$$

Result (type 7, 130 leaves):

$$-\frac{8}{5}\text{RootSum}\left[b+5\,b\,\#1^2+10\,b\,\#1^4-32\,a\,\#1^5+10\,b\,\#1^6+5\,b\,\#1^8+b\,\#1^{10}\,\&,\ \frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^3-i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^3}{b+4\,b\,\#1^2-16\,a\,\#1^3+6\,b\,\#1^4+4\,b\,\#1^6+b\,\#1^8}\,\&\right]$$

## Problem 78: Result is not expressed in closed-form.

$$\int \frac{1}{a - b\,\text{Cos}[x]^6}\,dx$$

Optimal (type 3, 175 leaves, 7 steps):

$$-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}-b^{1/3}}\,\text{Cot}[x]}{a^{1/6}}\right]}{3\,a^{5/6}\sqrt{a^{1/3}-b^{1/3}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}+(-1)^{1/3}b^{1/3}}\,\text{Cot}[x]}{a^{1/6}}\right]}{3\,a^{5/6}\sqrt{a^{1/3}+(-1)^{1/3}b^{1/3}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/3}-(-1)^{2/3}b^{1/3}}\,\text{Cot}[x]}{a^{1/6}}\right]}{3\,a^{5/6}\sqrt{a^{1/3}-(-1)^{2/3}b^{1/3}}}$$

Result (type 7, 146 leaves):

$$-\frac{8}{3}\,\text{RootSum}\left[b+6\,b\,\#1+15\,b\,\#1^2-64\,a\,\#1^3+20\,b\,\#1^3+15\,b\,\#1^4+6\,b\,\#1^5+b\,\#1^6\,\&,\ \frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[2\,x]}{\text{Cos}[2\,x]-\#1}\right]\#1^2-i\,\text{Log}\left[1-2\,\text{Cos}[2\,x]\,\#1+\#1^2\right]\#1^2}{b+5\,b\,\#1-32\,a\,\#1^2+10\,b\,\#1^2+10\,b\,\#1^3+5\,b\,\#1^4+b\,\#1^5}\,\&\right]$$

## Problem 79: Result is not expressed in closed-form.

$$\int \frac{1}{a - b\,\text{Cos}[x]^8}\,dx$$

Optimal (type 3, 213 leaves, 9 steps):

$$-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/4}-b^{1/4}}\,\text{Cot}[x]}{a^{1/8}}\right]}{4\,a^{7/8}\sqrt{a^{1/4}-b^{1/4}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/4}-i\,b^{1/4}}\,\text{Cot}[x]}{a^{1/8}}\right]}{4\,a^{7/8}\sqrt{a^{1/4}-i\,b^{1/4}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/4}+i\,b^{1/4}}\,\text{Cot}[x]}{a^{1/8}}\right]}{4\,a^{7/8}\sqrt{a^{1/4}+i\,b^{1/4}}}-\frac{\text{ArcTan}\left[\frac{\sqrt{a^{1/4}+b^{1/4}}\,\text{Cot}[x]}{a^{1/8}}\right]}{4\,a^{7/8}\sqrt{a^{1/4}+b^{1/4}}}$$

Result (type 7, 172 leaves):

$$-8\,\text{RootSum}\Big[b+8\,b\,\#1+28\,b\,\#1^2+56\,b\,\#1^3-256\,a\,\#1^4+70\,b\,\#1^4+56\,b\,\#1^5+28\,b\,\#1^6+8\,b\,\#1^7+b\,\#1^8\,\&,$$
$$\frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[2\,x]}{\text{Cos}[2\,x]-\#1}\right]\#1^3-i\,\text{Log}\left[1-2\,\text{Cos}[2\,x]\,\#1+\#1^2\right]\#1^3}{b+7\,b\,\#1+21\,b\,\#1^2-128\,a\,\#1^3+35\,b\,\#1^3+35\,b\,\#1^4+21\,b\,\#1^5+7\,b\,\#1^6+b\,\#1^7}\,\&\Big]$$

## Problem 80: Result is not expressed in closed-form.

$$\int \frac{1}{1+\text{Cos}[x]^5}\,dx$$

Optimal (type 3, 223 leaves, 11 steps):

$$\frac{2\,\text{ArcTan}\left[\sqrt{\frac{1-(-1)^{2/5}}{1+(-1)^{2/5}}}\,\text{Tan}\left[\frac{x}{2}\right]\right]}{5\sqrt{1-(-1)^{4/5}}}+\frac{2\,\text{ArcTan}\left[\sqrt{\frac{1-(-1)^{4/5}}{1+(-1)^{4/5}}}\,\text{Tan}\left[\frac{x}{2}\right]\right]}{5\sqrt{1+(-1)^{3/5}}}-$$

$$\frac{2\,\text{ArcTanh}\left[\frac{\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{-\frac{1-(-1)^{1/5}}{1+(-1)^{1/5}}}}\right]}{5\sqrt{-1+(-1)^{2/5}}}-\frac{2\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\text{ArcTanh}\left[\sqrt{-\frac{1+(-1)^{3/5}}{1-(-1)^{3/5}}}\,\text{Tan}\left[\frac{x}{2}\right]\right]}{5\left(1+(-1)^{3/5}\right)}+\frac{\text{Sin}[x]}{5\,(1+\text{Cos}[x])}$$

Result (type 7, 378 leaves) :

$$-\frac{1}{10}\text{RootSum}\Big[1-2\,\#1+8\,\#1^2-14\,\#1^3+30\,\#1^4-14\,\#1^5+8\,\#1^6-2\,\#1^7+\#1^8\,\&,$$
$$\frac{1}{-1+8\,\#1-21\,\#1^2+60\,\#1^3-35\,\#1^4+24\,\#1^5-7\,\#1^6+4\,\#1^7}\Big(2\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]-i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]-8\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1+$$
$$4\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1+30\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^2-15\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^2-80\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^3+$$
$$40\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^3+30\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^4-15\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^4-8\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^5+$$
$$4\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^5+2\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\#1}\right]\#1^6-i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\#1+\#1^2\right]\#1^6\Big)\,\&\Big]+\frac{1}{5}\text{Tan}\left[\frac{x}{2}\right]$$

- **Problem 82: Result is not expressed in closed-form.**

$$\int\frac{1}{1+\text{Cos}[x]^8}\,dx$$

Optimal (type 3, 129 leaves, 9 steps) :

$$-\frac{\text{ArcTan}\left[\sqrt{1-(-1)^{1/4}}\,\text{Cot}[x]\right]}{4\sqrt{1-(-1)^{1/4}}}-\frac{\text{ArcTan}\left[\sqrt{1+(-1)^{1/4}}\,\text{Cot}[x]\right]}{4\sqrt{1+(-1)^{1/4}}}-\frac{\text{ArcTan}\left[\sqrt{1-(-1)^{3/4}}\,\text{Cot}[x]\right]}{4\sqrt{1-(-1)^{3/4}}}-\frac{\text{ArcTan}\left[\sqrt{1+(-1)^{3/4}}\,\text{Cot}[x]\right]}{4\sqrt{1+(-1)^{3/4}}}$$

Result (type 7, 141 leaves) :

$$8\,\text{RootSum}\Big[1+8\,\#1+28\,\#1^2+56\,\#1^3+326\,\#1^4+56\,\#1^5+28\,\#1^6+8\,\#1^7+\#1^8\,\&,\frac{2\,\text{ArcTan}\left[\frac{\text{Sin}[2\,x]}{\text{Cos}[2\,x]-\#1}\right]\#1^3-i\,\text{Log}\left[1-2\,\text{Cos}[2\,x]\,\#1+\#1^2\right]\#1^3}{1+7\,\#1+21\,\#1^2+163\,\#1^3+35\,\#1^4+21\,\#1^5+7\,\#1^6+\#1^7}\,\&\Big]$$

- **Problem 83: Result is not expressed in closed-form.**

$$\int\frac{1}{1-\text{Cos}[x]^5}\,dx$$

Optimal (type 3, 205 leaves, 11 steps) :

$$\frac{2\,\text{ArcTan}\left[\sqrt{\frac{1-(-1)^{1/5}}{1+(-1)^{1/5}}}\,\text{Tan}\left[\frac{x}{2}\right]\right]}{5\sqrt{1-(-1)^{2/5}}}+\frac{2\,\text{ArcTan}\left[\sqrt{\frac{1-(-1)^{3/5}}{1+(-1)^{3/5}}}\,\text{Tan}\left[\frac{x}{2}\right]\right]}{5\sqrt{1+(-1)^{1/5}}}-\frac{2\,\text{ArcTanh}\left[\frac{\text{Tan}\left[\frac{x}{2}\right]}{\sqrt{-\frac{1-(-1)^{2/5}}{1+(-1)^{2/5}}}}\right]}{5\sqrt{-1+(-1)^{4/5}}}+\frac{2\,\text{ArcTanh}\left[\sqrt{-\frac{1+(-1)^{4/5}}{1-(-1)^{4/5}}}\,\text{Tan}\left[\frac{x}{2}\right]\right]}{5\sqrt{-1-(-1)^{3/5}}}-\frac{\text{Sin}[x]}{5\,(1-\text{Cos}[x])}$$

Result (type 7, 378 leaves) :

$$-\frac{1}{5}\,\text{Cot}\left[\frac{x}{2}\right]+\frac{1}{10}\,\text{RootSum}\Big[1+2\,\sharp1+8\,\sharp1^2+14\,\sharp1^3+30\,\sharp1^4+14\,\sharp1^5+8\,\sharp1^6+2\,\sharp1^7+\sharp1^8\,\&,$$
$$\frac{1}{1+8\,\sharp1+21\,\sharp1^2+60\,\sharp1^3+35\,\sharp1^4+24\,\sharp1^5+7\,\sharp1^6+4\,\sharp1^7}\Bigg(2\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]-i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]+$$
$$8\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]\sharp1-4\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]\sharp1+30\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]\sharp1^2-15\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]\sharp1^2+$$
$$80\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]\sharp1^3-40\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]\sharp1^3+30\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]\sharp1^4-15\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]\sharp1^4+$$
$$8\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]\sharp1^5-4\,i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]\sharp1^5+2\,\text{ArcTan}\left[\frac{\text{Sin}[x]}{\text{Cos}[x]-\sharp1}\right]\sharp1^6-i\,\text{Log}\left[1-2\,\text{Cos}[x]\,\sharp1+\sharp1^2\right]\sharp1^6\Bigg)\,\&\Big]$$

- **Problem 88: Result more than twice size of optimal antiderivative.**

$$\int\sqrt{1-\text{Cos}[x]^2}\,\text{Tan}[x]\,dx$$

Optimal (type 3, 20 leaves, 5 steps) :

$$\text{ArcTanh}\left[\sqrt{\text{Sin}[x]^2}\right]-\sqrt{\text{Sin}[x]^2}$$

Result (type 3, 47 leaves) :

$$-\text{Csc}[x]\,\sqrt{\text{Sin}[x]^2}\,\left(\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]+\text{Sin}[x]\right)$$

- **Problem 91: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Tan}[x]}{\sqrt{1-\text{Cos}[x]^2}}\,dx$$

Optimal (type 3, 9 leaves, 4 steps) :

$$\text{ArcTanh}\left[\sqrt{\text{Sin}[x]^2}\right]$$

Result (type 3, 44 leaves) :

$$\frac{\left(-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]\right)\text{Sin}[x]}{\sqrt{\text{Sin}[x]^2}}$$

- **Problem 92: Result is not expressed in closed-form.**

$$\int \frac{\mathrm{Tan}[x]^3}{a+b\,\mathrm{Cos}[x]^3}\,dx$$

Optimal (type 3, 153 leaves, 11 steps):

$$-\frac{b^{2/3}\,\mathrm{ArcTan}\left[\frac{a^{1/3}-2\,b^{1/3}\,\mathrm{Cos}[x]}{\sqrt{3}\,a^{1/3}}\right]}{\sqrt{3}\,a^{5/3}}+\frac{\mathrm{Log}[\mathrm{Cos}[x]]}{a}+\frac{b^{2/3}\,\mathrm{Log}\left[a^{1/3}+b^{1/3}\,\mathrm{Cos}[x]\right]}{3\,a^{5/3}}-\frac{b^{2/3}\,\mathrm{Log}\left[a^{2/3}-a^{1/3}\,b^{1/3}\,\mathrm{Cos}[x]+b^{2/3}\,\mathrm{Cos}[x]^2\right]}{6\,a^{5/3}}-\frac{\mathrm{Log}\left[a+b\,\mathrm{Cos}[x]^3\right]}{3\,a}+\frac{\mathrm{Sec}[x]^2}{2\,a}$$

Result (type 7, 217 leaves):

$$\frac{1}{6\,a}\left(6\left(\mathrm{Log}[\mathrm{Cos}[x]]+\mathrm{Log}\left[\mathrm{Sec}\left[\frac{x}{2}\right]^2\right]\right)-2\,\mathrm{RootSum}\left[a+b+3\,a\,\#1-3\,b\,\#1+3\,a\,\#1^2+3\,b\,\#1^2+a\,\#1^3-b\,\#1^3\,\&,\ \left(a\,\mathrm{Log}\left[-\#1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right]+b\,\mathrm{Log}\left[-\#1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right]+2\,a\,\mathrm{Log}\left[-\#1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right]\#1+4\,b\,\mathrm{Log}\left[-\#1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right]\#1+a\,\mathrm{Log}\left[-\#1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right]\#1^2-b\,\mathrm{Log}\left[-\#1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right]\#1^2\right)\Big/\left(a-b+2\,a\,\#1+2\,b\,\#1+a\,\#1^2-b\,\#1^2\right)\,\&\right]+3\,\mathrm{Sec}[x]^2\right)$$

- **Problem 93: Result more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b\,\mathrm{Cos}[x]^3}\,\mathrm{Tan}[x]\,dx$$

Optimal (type 3, 45 leaves, 5 steps):

$$\frac{2}{3}\sqrt{a}\,\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cos}[x]^3}}{\sqrt{a}}\right]-\frac{2}{3}\sqrt{a+b\,\mathrm{Cos}[x]^3}$$

Result (type 3, 668 leaves):

$$-\left(\left(\sqrt{4\,a+3\,b\,\mathrm{Cos}[x]+b\,\mathrm{Cos}[3\,x]}\left(b+a\left(\mathrm{Sec}[x]^2\right)^{3/2}-\sqrt{a}\,\sqrt{b}\,\mathrm{ArcSinh}\left[\frac{\sqrt{a}\,\left(\mathrm{Sec}[x]^2\right)^{3/4}}{\sqrt{b}}\right]\left(\mathrm{Sec}[x]^2\right)^{3/4}\sqrt{1+\frac{a\left(\mathrm{Sec}[x]^2\right)^{3/2}}{b}}\right)\mathrm{Tan}[x]\sqrt{\mathrm{Cos}[x]^4\left(a+b\sqrt{\mathrm{Sec}[x]^2}+2\,a\,\mathrm{Tan}[x]^2+a\,\mathrm{Tan}[x]^4\right)}\right)\Big/\left(3\left(b+a\left(\mathrm{Sec}[x]^2\right)^{3/2}\right)\right.$$

$$\left(\frac{1}{\left(b+a\left(\text{Sec}[x]^2\right)^{3/2}\right)^2}2\,a\left(\text{Sec}[x]^2\right)^{3/2}\left(b+a\left(\text{Sec}[x]^2\right)^{3/2}-\sqrt{a}\,\sqrt{b}\,\text{ArcSinh}\left[\frac{\sqrt{a}\,\left(\text{Sec}[x]^2\right)^{3/4}}{\sqrt{b}}\right]\left(\text{Sec}[x]^2\right)^{3/4}\sqrt{1+\frac{a\left(\text{Sec}[x]^2\right)^{3/2}}{b}}\right)\right.$$

$$\text{Tan}[x]\sqrt{\text{Cos}[x]^4\left(a+b\sqrt{\text{Sec}[x]^2}+2\,a\,\text{Tan}[x]^2+a\,\text{Tan}[x]^4\right)}-\frac{1}{3\left(b+a\left(\text{Sec}[x]^2\right)^{3/2}\right)}$$

$$2\left(\frac{3}{2}a\left(\text{Sec}[x]^2\right)^{3/2}\text{Tan}[x]-\frac{3\,a^{3/2}\,\text{ArcSinh}\left[\frac{\sqrt{a}\,\left(\text{Sec}[x]^2\right)^{3/4}}{\sqrt{b}}\right]\left(\text{Sec}[x]^2\right)^{9/4}\text{Tan}[x]}{2\sqrt{b}\sqrt{1+\frac{a\left(\text{Sec}[x]^2\right)^{3/2}}{b}}}-\frac{3}{2}\sqrt{a}\,\sqrt{b}\,\text{ArcSinh}\left[\frac{\sqrt{a}\,\left(\text{Sec}[x]^2\right)^{3/4}}{\sqrt{b}}\right]\right.$$

$$\left.\left(\text{Sec}[x]^2\right)^{3/4}\sqrt{1+\frac{a\left(\text{Sec}[x]^2\right)^{3/2}}{b}}\,\text{Tan}[x]\right)\sqrt{\text{Cos}[x]^4\left(a+b\sqrt{\text{Sec}[x]^2}+2\,a\,\text{Tan}[x]^2+a\,\text{Tan}[x]^4\right)}-$$

$$\left(\left(b+a\left(\text{Sec}[x]^2\right)^{3/2}-\sqrt{a}\,\sqrt{b}\,\text{ArcSinh}\left[\frac{\sqrt{a}\,\left(\text{Sec}[x]^2\right)^{3/4}}{\sqrt{b}}\right]\left(\text{Sec}[x]^2\right)^{3/4}\sqrt{1+\frac{a\left(\text{Sec}[x]^2\right)^{3/2}}{b}}\right)\left(\text{Cos}[x]^4\right.\right.$$

$$\left.\left.\left(4\,a\,\text{Sec}[x]^2\,\text{Tan}[x]+b\sqrt{\text{Sec}[x]^2}\,\text{Tan}[x]+4\,a\,\text{Sec}[x]^2\,\text{Tan}[x]^3\right)-4\,\text{Cos}[x]^3\,\text{Sin}[x]\left(a+b\sqrt{\text{Sec}[x]^2}+2\,a\,\text{Tan}[x]^2+a\,\text{Tan}[x]^4\right)\right)\right)\Big/$$

$$\left.\left.\left.\left(3\left(b+a\left(\text{Sec}[x]^2\right)^{3/2}\right)\sqrt{\text{Cos}[x]^4\left(a+b\sqrt{\text{Sec}[x]^2}+2\,a\,\text{Tan}[x]^2+a\,\text{Tan}[x]^4\right)}\right)\right)\right)\right)$$

- **Problem 94: Result more than twice size of optimal antiderivative.**

$$\int\frac{\text{Tan}[x]}{\sqrt{a+b\,\text{Cos}[x]^3}}\,dx$$

Optimal (type 3, 28 leaves, 4 steps) :

$$\frac{2\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cos}[x]^3}}{\sqrt{a}}\right]}{3\sqrt{a}}$$

Result (type 3, 207 leaves) :

$$\left(128\sqrt{b}\,\text{ArcSinh}\left[\frac{\sqrt{a}\,\left(\text{Sec}[x]^2\right)^{3/4}}{\sqrt{b}}\right]\text{Cos}[x]^4\,\left(\text{Sec}[x]^2\right)^{3/4}\left(b\,\text{Cos}[x]^2+a\sqrt{\text{Sec}[x]^2}\right)\right.$$
$$\left.\sqrt{1+\frac{a\,\left(\text{Sec}[x]^2\right)^{3/2}}{b}}\,\left(a+2\,a\,\text{Cot}[x]^2+\text{Cot}[x]^4\left(a+b\sqrt{\text{Sec}[x]^2}\right)\right)\text{Sin}[x]^4\right)\Big/\left(3\sqrt{a}\,\sqrt{4\,a+3\,b\,\text{Cos}[x]+b\,\text{Cos}[3\,x]}\right.$$
$$\left.\left(32\,a^2+10\,b^2+b^2\,\text{Cos}[6\,x]+24\,a\,b\sqrt{\text{Sec}[x]^2}+2\,b\,\text{Cos}[4\,x]\left(3\,b+4\,a\sqrt{\text{Sec}[x]^2}\right)+b\,\text{Cos}[2\,x]\left(15\,b+32\,a\sqrt{\text{Sec}[x]^2}\right)\right)\right)$$

- **Problem 95: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\sqrt{a+b\,\text{Cos}[x]^4}\,\text{Tan}[x]\,dx$$

Optimal (type 3, 45 leaves, 5 steps) :

$$\frac{1}{2}\sqrt{a}\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cos}[x]^4}}{\sqrt{a}}\right]-\frac{1}{2}\sqrt{a+b\,\text{Cos}[x]^4}$$

Result (type 4, 47 997 leaves) : Display of huge result suppressed!

- **Problem 96: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int\frac{\text{Tan}[x]}{\sqrt{a+b\,\text{Cos}[x]^4}}\,dx$$

Optimal (type 3, 28 leaves, 4 steps) :

$$\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cos}[x]^4}}{\sqrt{a}}\right]}{2\sqrt{a}}$$

Result (type 4, 48 584 leaves) : Display of huge result suppressed!

# Test results for the 21 problems in "4.2.8 (a+b cos)^m (c+d trig)^n.m"

- **Problem 9: Result more than twice size of optimal antiderivative.**

$$\int \frac{(c+d\,\mathrm{Sec}[e+f\,x])^4}{a+b\,\mathrm{Cos}[e+f\,x]}\,dx$$

Optimal (type 3, 247 leaves, 12 steps):

$$\frac{2\,(a\,c-b\,d)^4\,\mathrm{ArcTan}\left[\frac{\sqrt{a-b}\,\mathrm{Tan}\left[\frac{1}{2}\,(e+f\,x)\right]}{\sqrt{a+b}}\right]}{a^4\,\sqrt{a-b}\,\sqrt{a+b}\,f}+\frac{d^3\,(4\,a\,c-b\,d)\,\mathrm{ArcTanh}[\mathrm{Sin}[e+f\,x]]}{2\,a^2\,f}+\frac{d\,(2\,a\,c-b\,d)\,\left(2\,a^2\,c^2-2\,a\,b\,c\,d+b^2\,d^2\right)\,\mathrm{ArcTanh}[\mathrm{Sin}[e+f\,x]]}{a^4\,f}+$$
$$\frac{d^4\,\mathrm{Tan}[e+f\,x]}{a\,f}+\frac{d^2\,\left(6\,a^2\,c^2-4\,a\,b\,c\,d+b^2\,d^2\right)\,\mathrm{Tan}[e+f\,x]}{a^3\,f}+\frac{d^3\,(4\,a\,c-b\,d)\,\mathrm{Sec}[e+f\,x]\,\mathrm{Tan}[e+f\,x]}{2\,a^2\,f}+\frac{d^4\,\mathrm{Tan}[e+f\,x]^3}{3\,a\,f}$$

Result (type 3, 952 leaves):

$$-\frac{2\,(a c-b d)^4 \operatorname{ArcTanh}\left[\frac{(a-b)\operatorname{Tan}\left[\frac{1}{2}(e+f x)\right]}{\sqrt{-a^2+b^2}}\right] \operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4}{a^4 \sqrt{-a^2+b^2}\, f\,(d+c \operatorname{Cos}[e+f x])^4}+\frac{1}{2 a^4 f\,(d+c \operatorname{Cos}[e+f x])^4}$$

$$\left(-8 a^3 c^3 d+12 a^2 b c^2 d^2-4 a^3 c d^3-8 a b^2 c d^3+a^2 b d^4+2 b^3 d^4\right) \operatorname{Cos}[e+f x]^4 \operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]-\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right](c+d \operatorname{Sec}[e+f x])^4+$$

$$\frac{1}{2 a^4 f\,(d+c \operatorname{Cos}[e+f x])^4}\left(8 a^3 c^3 d-12 a^2 b c^2 d^2+4 a^3 c d^3+8 a b^2 c d^3-a^2 b d^4-2 b^3 d^4\right) \operatorname{Cos}[e+f x]^4$$

$$\operatorname{Log}\left[\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]+\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right](c+d \operatorname{Sec}[e+f x])^4+\frac{\left(12 a c d^3+a d^4-3 b d^4\right) \operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4}{12 a^2 f\,(d+c \operatorname{Cos}[e+f x])^4\left(\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]-\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)^2}+$$

$$\frac{d^4 \operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]}{6 a f\,(d+c \operatorname{Cos}[e+f x])^4\left(\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]-\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)^3}+\frac{d^4 \operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]}{6 a f\,(d+c \operatorname{Cos}[e+f x])^4\left(\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]+\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)^3}+$$

$$\frac{\left(-12 a c d^3-a d^4+3 b d^4\right) \operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4}{12 a^2 f\,(d+c \operatorname{Cos}[e+f x])^4\left(\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]+\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)^2}+\left(\operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4\right.$$

$$\left.\left(18 a^2 c^2 d^2 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]-12 a b c d^3 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]+2 a^2 d^4 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]+3 b^2 d^4 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)\right)\Big/$$

$$\left(3 a^3 f\,(d+c \operatorname{Cos}[e+f x])^4\left(\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]-\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)\right)+\left(\operatorname{Cos}[e+f x]^4\,(c+d \operatorname{Sec}[e+f x])^4\right.$$

$$\left.\left(18 a^2 c^2 d^2 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]-12 a b c d^3 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]+2 a^2 d^4 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]+3 b^2 d^4 \operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)\right)\Big/$$

$$\left(3 a^3 f\,(d+c \operatorname{Cos}[e+f x])^4\left(\operatorname{Cos}\left[\frac{1}{2}(e+f x)\right]+\operatorname{Sin}\left[\frac{1}{2}(e+f x)\right]\right)\right)$$

### ■ Problem 16: Unable to integrate problem.

$$\int \frac{\sqrt{c+d \operatorname{Sec}[e+f x]}}{a+b \operatorname{Cos}[e+f x]}\,dx$$

Optimal (type 4, 213 leaves, 4 steps):

$$\frac{2 \sqrt{c+d}\, \operatorname{Cot}[e+f x] \operatorname{EllipticF}\left[\operatorname{ArcSin}\left[\frac{\sqrt{c+d \operatorname{Sec}[e+f x]}}{\sqrt{c+d}}\right], \frac{c+d}{c-d}\right] \sqrt{\frac{d\,(1-\operatorname{Sec}[e+f x])}{c+d}} \sqrt{-\frac{d\,(1+\operatorname{Sec}[e+f x])}{c-d}}}{a f}+$$

$$\frac{2\,(a c-b d) \operatorname{EllipticPi}\left[\frac{2 a}{a+b}, \operatorname{ArcSin}\left[\frac{\sqrt{1-\operatorname{Sec}[e+f x]}}{\sqrt{2}}\right], \frac{2 d}{c+d}\right] \sqrt{\frac{c+d \operatorname{Sec}[e+f x]}{c+d}}\, \operatorname{Tan}[e+f x]}{a\,(a+b)\, f \sqrt{c+d \operatorname{Sec}[e+f x]}\, \sqrt{-\operatorname{Tan}[e+f x]^2}}$$

Result (type 8, 29 leaves) :

$$\int \frac{\sqrt{c + d\,\text{Sec}[e + f\,x]}}{a + b\,\text{Cos}[e + f\,x]}\,dx$$

- **Problem 17: Unable to integrate problem.**

$$\int \frac{1}{(a + b\,\text{Cos}[e + f\,x])\,\sqrt{c + d\,\text{Sec}[e + f\,x]}}\,dx$$

Optimal (type 4, 102 leaves, 2 steps) :

$$\frac{2\,\text{EllipticPi}\left[\frac{2\,a}{a+b},\,\text{ArcSin}\left[\frac{\sqrt{1-\text{Sec}[e+f\,x]}}{\sqrt{2}}\right],\,\frac{2\,d}{c+d}\right]\,\sqrt{\frac{c+d\,\text{Sec}[e+f\,x]}{c+d}}\,\text{Tan}[e + f\,x]}{(a + b)\,f\,\sqrt{c + d\,\text{Sec}[e + f\,x]}\,\sqrt{-\text{Tan}[e + f\,x]^2}}$$

Result (type 8, 29 leaves) :

$$\int \frac{1}{(a + b\,\text{Cos}[e + f\,x])\,\sqrt{c + d\,\text{Sec}[e + f\,x]}}\,dx$$

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# Test results for the 20 problems in "4.2.9 trig^m (a+b cos^n+c cos^(2 n))^p.m"

- **Problem 5: Result unnecessarily involves imaginary or complex numbers.**

$$\int \frac{\text{Csc}[x]^3}{a + b\,\text{Cos}[x] + c\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 205 leaves, 10 steps) :

$$\frac{\left(b^4 + 2\,c^2\,(a + c)^2 - 2\,b^2\,c\,(2\,a + c)\right)\,\text{ArcTanh}\left[\frac{b+2\,c\,\text{Cos}[x]}{\sqrt{b^2-4\,a\,c}}\right]}{\sqrt{b^2 - 4\,a\,c}\,\left(a^2 - b^2 + 2\,a\,c + c^2\right)^2} + \frac{(b - (a + c)\,\text{Cos}[x])\,\text{Csc}[x]^2}{2\,(a - b + c)\,(a + b + c)} + \frac{(a + 2\,b + 3\,c)\,\text{Log}[1 - \text{Cos}[x]]}{4\,(a + b + c)^2} - \frac{(a - 2\,b + 3\,c)\,\text{Log}[1 + \text{Cos}[x]]}{4\,(a - b + c)^2} - \frac{b\,\left(b^2 - 2\,c\,(a + c)\right)\,\text{Log}\left[a + b\,\text{Cos}[x] + c\,\text{Cos}[x]^2\right]}{2\,\left(a^2 - b^2 + 2\,a\,c + c^2\right)^2}$$

Result (type 3, 392 leaves) :

$$\frac{1}{8}\left(\frac{16\,i\left(b^3-2\,b\,c\,(a+c)\right)x}{(a-b+c)^2\,(a+b+c)^2}+\frac{4\,i\,(a-2\,b+3\,c)\,\text{ArcTan}[\text{Tan}[x]]}{(a-b+c)^2}-\frac{4\,i\,(a+2\,b+3\,c)\,\text{ArcTan}[\text{Tan}[x]]}{(a+b+c)^2}-\frac{\text{Csc}\left[\frac{x}{2}\right]^2}{a+b+c}-\frac{2\,(a-2\,b+3\,c)\,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]^2\right]}{(a-b+c)^2}-\right.$$

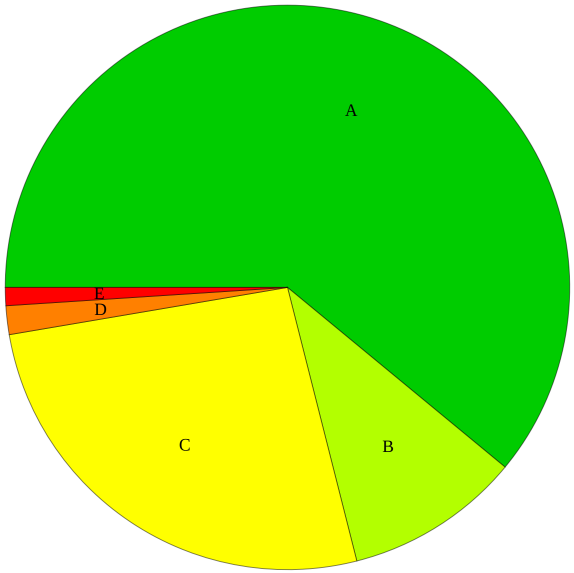
$$\frac{4\left(b^4+2\,c^2\,(a+c)^2-2\,b^2\,c\,(2\,a+c)+b^3\sqrt{b^2-4\,a\,c}-2\,b\,c\,(a+c)\sqrt{b^2-4\,a\,c}\right)\text{Log}\left[-b+\sqrt{b^2-4\,a\,c}-2\,c\,\text{Cos}[x]\right]}{\sqrt{b^2-4\,a\,c}\,\left(a^2-b^2+2\,a\,c+c^2\right)^2}-$$

$$\frac{4\left(-b^4-2\,c^2\,(a+c)^2+2\,b^2\,c\,(2\,a+c)+b^3\sqrt{b^2-4\,a\,c}-2\,b\,c\,(a+c)\sqrt{b^2-4\,a\,c}\right)\text{Log}\left[b+\sqrt{b^2-4\,a\,c}+2\,c\,\text{Cos}[x]\right]}{\sqrt{b^2-4\,a\,c}\,\left(a^2-b^2+2\,a\,c+c^2\right)^2}+$$

$$\left.\frac{2\,(a+2\,b+3\,c)\,\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]^2\right]}{(a+b+c)^2}+\frac{\text{Sec}\left[\frac{x}{2}\right]^2}{a-b+c}\right)$$

# Summary of Integration Test Results

4442 integration problems




A - 2709 optimal antiderivatives

B - 447 more than twice size of optimal antiderivatives

C - 1167 unnecessarily complex antiderivatives

D - 73 unable to integrate problems

E - 46 integration timeouts