Mathematica 11.3 Integration Test Results

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

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

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

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

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

Result (type 6, 2235 leaves):

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

$$2\left(392 a^3 b-722 a b^3\right) \text{Cos}[c+d x]^2 \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right) \left(\frac{1}{4 \sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{3/4}} a \left(-2 \text{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \text{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]- \text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]+ \text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]\right)+ \left(5 b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]} \sqrt{1-\text{Sin}[c+d x]^2}\right)\Big/ \left(\left(-5 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+ 2 \left(2 b^2 \text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\left(a^2-b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)+\frac{1}{\left(a+b \text{Cos}[c+d x]\right) \sqrt{1-\text{Sin}[c+d x]^2}}$$

$$2\left(-280 a^4+636 a^2 b^2-721 b^4\right) \text{Cos}[c+d x] \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right) \left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right) \sqrt{b} \left(2 \text{ArcTan}\left[1-\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2 \text{ArcTan}\left[1+\frac{(1+i) \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+ \text{Log}\left[\sqrt{-a^2+b^2}-(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]- \text{Log}\left[\sqrt{-a^2+b^2}+(1+i) \sqrt{b} \left(-a^2+b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+i b \text{Sin}[c+d x]\right]\right)+ \left(5 a \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]}\right)\Big/ \left(\sqrt{1-\text{Sin}[c+d x]^2} \left(5 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]-2 \left(2 b^2 \text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2, \frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right) \left(a^2+b^2 \left(-1+\text{Sin}[c+d x]^2\right)\right)\right)\right)+$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Problem 59: Result unnecessarily involves higher level functions and more than

twice size of optimal antiderivative.

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

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

$$-\frac{\left(-a^2+b^2\right)^{7/4} e^{9/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{b^{9/2} d}+\frac{\left(-a^2+b^2\right)^{7/4} e^{9/2} \operatorname{ArcTanh}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Sin}[c+d x]}}{\left(-a^2+b^2\right)^{1/4} \sqrt{e}}\right]}{b^{9/2} d}+$$
$$\left(a \left(a^2-b^2\right)^2 e^5 \operatorname{EllipticPi}\left[\frac{2 b}{b-\sqrt{-a^2+b^2}}, \frac{1}{2}\left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}\right) \Big/$$
$$\left(b^5 \left(b-\sqrt{-a^2+b^2}\right) d \sqrt{e \operatorname{Sin}[c+d x]}\right)+$$
$$\left(a \left(a^2-b^2\right)^2 e^5 \operatorname{EllipticPi}\left[\frac{2 b}{b+\sqrt{-a^2+b^2}}, \frac{1}{2}\left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{\operatorname{Sin}[c+d x]}\right) \Big/$$
$$\left(b^5 \left(b+\sqrt{-a^2+b^2}\right) d \sqrt{e \operatorname{Sin}[c+d x]}\right)-$$
$$\frac{2 a \left(5 a^2-8 b^2\right) e^4 \operatorname{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d x\right), 2\right] \sqrt{e \operatorname{Sin}[c+d x]}}{5 b^4 d \sqrt{\operatorname{Sin}[c+d x]}}+$$
$$\frac{2 e^3 \left(5 \left(a^2-b^2\right)-3 a b \operatorname{Cos}[c+d x]\right) (e \operatorname{Sin}[c+d x])^{3/2}}{15 b^3 d}-\frac{2 e (e \operatorname{Sin}[c+d x])^{7/2}}{7 b d}$$

Result (type 6, 1228 leaves):

$$-\frac{1}{5 b^3 d \operatorname{Sin}[c+d x]^{9/2}} (e \operatorname{Sin}[c+d x])^{9/2}$$
$$\left(\frac{1}{(a+b \operatorname{Cos}[c+d x]) \left(1-\operatorname{Sin}[c+d x]^2\right)} 2 \left(5 a^3-8 a b^2\right) \operatorname{Cos}[c+d x]^2 \left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right)\right.$$
$$\left(\left(a \left(-2 \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\operatorname{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\operatorname{Log}\left[\right.\right.\right.\right.$$
$$\left.\sqrt{a^2-b^2}-\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]-\operatorname{Log}\left[\right.$$
$$\left.\left.\left.\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\operatorname{Sin}[c+d x]}+b \operatorname{Sin}[c+d x]\right]\right)\right) \Big/$$
$$\left(4 \sqrt{2} b^{3/2} \left(a^2-b^2\right)^{1/4}\right)+\left(7 b \left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{3}{4}, -\frac{1}{2}, 1, \frac{7}{4},\right.\right.$$
$$\left.\left.\operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right] \operatorname{Sin}[c+d x]^{3/2} \sqrt{1-\operatorname{Sin}[c+d x]^2}\right) \Big/$$
$$\left(3 \left(-7 \left(a^2-b^2\right) \operatorname{AppellF1}\left[\frac{3}{4}, -\frac{1}{2}, 1, \frac{7}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+2\right.\right.$$
$$\left(2 b^2 \operatorname{AppellF1}\left[\frac{7}{4}, -\frac{1}{2}, 2, \frac{11}{4}, \operatorname{Sin}[c+d x]^2, \frac{b^2 \operatorname{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.$$

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\frac{1}{d}\text{Csc}[c+d x]^4\left(e\,\text{Sin}[c+d x]\right)^{9/2}\left(-\frac{\left(-28 a^2+37 b^2\right)\text{Sin}[c+d x]}{42 b^3}-\right.$$

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

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

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

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

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

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

Result (type 6, 2155 leaves):

$$\frac{\left(-\frac{2 a \text{Cos}[c+d x]}{3 b^2}+\frac{\text{Cos}[2 (c+d x)]}{5 b}\right) \text{Csc}[c+d x]^3 (e \text{Sin}[c+d x])^{7/2}}{d}+$$
$$\frac{1}{60 b^2 d \text{Sin}[c+d x]^{7/2}} (e \text{Sin}[c+d x])^{7/2}$$
$$\left(\frac{1}{(a+b \text{Cos}[c+d x]) \left(1-\text{Sin}[c+d x]^2\right)} 28 a b \text{Cos}[c+d x]^2 \left(a+b \sqrt{1-\text{Sin}[c+d x]^2}\right)\right.$$
$$\left(\left(a \left(-2 \text{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2 \text{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{b} \sqrt{\text{Sin}[c+d x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\right.\right.\right.$$
$$\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]+$$
$$\left.\left.\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{1/4} \sqrt{\text{Sin}[c+d x]}+b \text{Sin}[c+d x]\right]\right)\right)\Big/$$
$$\left(4 \sqrt{2} \sqrt{b} \left(a^2-b^2\right)^{3/4}\right)+\left(5 b \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\right.\right.$$
$$\left.\left.\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right] \sqrt{\text{Sin}[c+d x]} \sqrt{1-\text{Sin}[c+d x]^2}\right)\Big/$$
$$\left(\left(-5 \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\right.\right.$$
$$2 \left(2 b^2 \text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]+\left(a^2-b^2\right)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d x]^2,\frac{b^2 \text{Sin}[c+d x]^2}{-a^2+b^2}\right]\right) \text{Sin}[c+d x]^2\right)$$

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

$$2\left(-10\,a^2+27\,b^2\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Bigg(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}$$

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

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

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

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

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

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

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

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

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

$$\text{Cos}[c+d\,x]\,\text{Cos}\big[2\,(c+d\,x)\big]$$

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

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

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

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

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

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

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

$$\left(10\, a\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(5\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.$$
$$\left.\left.\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)-$$
$$\left(36\, a\, \left(a^2-b^2\right) \text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{5/2}\right)\Big/$$
$$\left(5\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(9\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d\,x]^2,\right.$$
$$\left.\left.\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)$$

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

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

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

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

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

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

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

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

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

Result (type 6, 1151 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

$$\left(\left((3+3\,i)\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\,(-a^2+b^2)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/\left(\sqrt{b}\,(-a^2+b^2)^{1/4}\right)+\left(56\,a\,(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\,(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+(-a^2+b^2)\,\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\,(-1+\text{Sin}[c+d\,x]^2)\right)\right)\right)$$

Problem 62: Result unnecessarily involves higher level functions.

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

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

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

Result (type 6, 624 leaves):

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

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

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

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

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

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

$$\left.(4+4\,i)\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}\right)+$$

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

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

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

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

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

Problem 63: Result unnecessarily involves higher level functions.

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

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

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

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

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

Result (type 6, 556 leaves):

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

Problem 64: Result unnecessarily involves higher level functions.

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

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

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

Result (type 6, 558 leaves):

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

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

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

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

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

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

Result (type 6, 1186 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Result (type 6, 1192 leaves):

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

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

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

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

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

$$-\frac{b^{7/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{9/4}\,d\,e^{7/2}}+\frac{b^{7/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{\left(-a^2+b^2\right)^{9/4}\,d\,e^{7/2}}+$$
$$\frac{2\,\left(b-a\,\text{Cos}[c+d\,x]\right)}{5\,\left(a^2-b^2\right)\,d\,e\,\left(e\,\text{Sin}[c+d\,x]\right)^{5/2}}-\frac{2\,\left(5\,b^3+a\,\left(3\,a^2-8\,b^2\right)\,\text{Cos}[c+d\,x]\right)}{5\,\left(a^2-b^2\right)^2\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{a\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^2\left(b-\sqrt{-a^2+b^2}\right)\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{a\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^2\left(b+\sqrt{-a^2+b^2}\right)\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$
$$\frac{2\,a\,\left(3\,a^2-8\,b^2\right)\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{5\,\left(a^2-b^2\right)^2\,d\,e^4\,\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 1275 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Result (type 6, 2229 leaves):

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

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

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

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

$$2\left(70 a^3 b-93 a b^3\right)\text{Cos}[c+d x]\left(a+b\sqrt{1-\text{Sin}[c+d x]^2}\right)\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\right.$$

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

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

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

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

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

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

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

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

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

$$\text{Cos}[c+d x]\,\text{Cos}[2(c+d x)]$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Result (type 6, 1229 leaves):

$$\frac{1}{10\,b^3\,d\,\text{Sin}[c+d\,x]^{9/2}}\,7\,\left(e\,\text{Sin}[c+d\,x]\right)^{9/2}$$
$$\left(\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\,\left(1-\text{Sin}[c+d\,x]^2\right)}\,2\,\left(5\,a^2-3\,b^2\right)\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\left(\left(a\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\right.\right.\right.\right.$$
$$\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-$$
$$\left.\left.\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\,\sqrt{2}\,b^{3/2}\,\left(a^2-b^2\right)^{1/4}\right)+\left(7\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sin}[c+d\,x]^{3/2}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/$$
$$\left(3\,\left(-7\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.\right.$$
$$2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$
$$\left.\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)$$
$$\left.\left.\left.\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+$$

$$\frac{1}{6\,(a+b\,\text{Cos}[c+d\,x])\,\sqrt{1-\text{Sin}[c+d\,x]^2}}\,a\,b\,\text{Cos}[c+d\,x]\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$
$$\Bigg(\Bigg((3+3\,i)\,\Bigg(2\,\text{ArcTan}\Big[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]-$$
$$2\,\text{ArcTan}\Big[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}}\Big]-\text{Log}\Big[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}$$
$$(-a^2+b^2)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\Big]+\text{Log}\Big[\sqrt{-a^2+b^2}+(1+i)$$
$$\sqrt{b}\,(-a^2+b^2)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\Big]\Bigg)\Bigg)\Big/\left(\sqrt{b}\,(-a^2+b^2)^{1/4}\right)+$$
$$\left(56\,a\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\,\text{Sin}[c+d\,x]^{3/2}\right)\Big/$$
$$\Bigg(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\Bigg(7\,(a^2-b^2)\,\text{AppellF1}\Big[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,$$
$$\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]-2\,\Bigg(2\,b^2\,\text{AppellF1}\Big[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,$$
$$\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]+(-a^2+b^2)\,\text{AppellF1}\Big[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,$$
$$\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\Bigg)\,\text{Sin}[c+d\,x]^2\Bigg)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\Bigg)\Bigg)+\frac{1}{d}$$
$$\text{Csc}[c+d\,x]^4\,(e\,\text{Sin}[c+d\,x])^{9/2}\,\Bigg(-\frac{4\,a\,\text{Sin}[c+d\,x]}{3\,b^3}+\frac{-a^2\,\text{Sin}[c+d\,x]+b^2\,\text{Sin}[c+d\,x]}{b^3\,(a+b\,\text{Cos}[c+d\,x])}+$$
$$\frac{\text{Sin}[2\,(c+d\,x)]}{5\,b^2}\Bigg)$$

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

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

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

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

Result (type 6, 2156 leaves):

$$\frac{\left(\frac{2\,\text{Cos}[c+d\,x]}{3\,b^2}+\frac{-a^2+b^2}{b^3\,\left(a+b\,\text{Cos}[c+d\,x]\right)}\right)\,\text{Csc}[c+d\,x]^3\,\left(e\,\text{Sin}[c+d\,x]\right)^{7/2}}{d}+$$
$$\frac{1}{6\,b^3\,d\,\text{Sin}[c+d\,x]^{7/2}}\left(e\,\text{Sin}[c+d\,x]\right)^{7/2}$$
$$\left(\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\,\left(1-\text{Sin}[c+d\,x]^2\right)}\,2\,\left(3\,a^2-5\,b^2\right)\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\left(a\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\right.\right.\right.$$
$$\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+$$
$$\left.\left.\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\,\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}\right)+\left(5\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\,-\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\,\sqrt{\text{Sin}[c+d\,x]}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/$$
$$\left(\left(-5\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\,-\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.\right.$$
$$2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\,-\frac{1}{2},\,2,\,\frac{9}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(a^2-b^2\right)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{5}{4},\,\frac{1}{2},\,1,\,\frac{9}{4},\,\text{Sin}[c+d\,x]^2,\,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\,\text{Sin}[c+d\,x]^2\right)$$

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

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

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

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

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

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

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

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

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

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

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

$$\text{Cos}[2\,(c+d\,x)]$$

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

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

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

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

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

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

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

$$\left(10\,a\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(5\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\,\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\,\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)-$$
$$\left(36\,a\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sin}[c+d\,x]^{5/2}\right)\Big/$$
$$\left(5\,\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(9\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\,\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\,\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\Bigg)$$

Problem 71: Result unnecessarily involves higher level functions.

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

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

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

Result (type 6, 616 leaves):

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

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

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

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

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

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

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

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

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

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

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

Problem 72: Result unnecessarily involves higher level functions.

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

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

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

Result (type 6, 614 leaves):

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

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

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

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

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

Result (type 6, 1181 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Result (type 6, 1182 leaves):

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

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

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

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

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

$$\left(4\,\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}\right)+\left(5\,b\,\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\right.\right.$$

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

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

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

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

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

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

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

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

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

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

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

Result (type 6, 1259 leaves) :

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

$$\left(56\, a\, (a^2-b^2)\, \text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Bigg/ \left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\,(a^2-b^2)\,\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+(-a^2+b^2)\,\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)$$

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

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

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

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

Result (type 6, 1257 leaves):

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

$$\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,\left(1-\text{Sin}[c+d\,x]^2\right)}2\,\left(2\,a^2\,b+5\,b^3\right)\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\left(\left(a\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\right.\right.\right.\right.$$
$$\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+$$
$$\left.\left.\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}\right)+\left(5\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/$$
$$\left(\left(-5\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.\right.$$
$$2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(a^2-b^2\right)\right.$$
$$\left.\left.\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)$$
$$\left.\left.\left.\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)+\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,\sqrt{1-\text{Sin}[c+d\,x]^2}}$$
$$2\,\left(2\,a^3-16\,a\,b^2\right)\,\text{Cos}[c+d\,x]\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\,\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\right.$$
$$\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\right.$$
$$\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]-$$
$$\left.\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\,\sqrt{b}\,\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+$$
$$\left(5\,a\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\,\left(5\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\,\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\,\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.$$
$$\left.\left.\left.\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\,\left(a^2+b^2\,\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

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

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

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

$$\frac{9\,a\,b^{7/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{2\,(-a^2+b^2)^{13/4}\,d\,e^{7/2}}-\frac{9\,a\,b^{7/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{2\,(-a^2+b^2)^{13/4}\,d\,e^{7/2}}-$$
$$\frac{b}{(a^2-b^2)\,d\,e\,(a+b\,\text{Cos}[c+d\,x])\,(e\,\text{Sin}[c+d\,x])^{5/2}}+$$
$$\frac{9\,a\,b-(2\,a^2+7\,b^2)\,\text{Cos}[c+d\,x]}{5\,(a^2-b^2)^2\,d\,e\,(e\,\text{Sin}[c+d\,x])^{5/2}}-\frac{3\,(15\,a\,b^3+(2\,a^4-10\,a^2\,b^2-7\,b^4)\,\text{Cos}[c+d\,x])}{5\,(a^2-b^2)^3\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{9\,a^2\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,(a^2-b^2)^3\,\left(b-\sqrt{-a^2+b^2}\right)\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}}+$$
$$\frac{9\,a^2\,b^3\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{\text{Sin}[c+d\,x]}}{2\,(a^2-b^2)^3\,\left(b+\sqrt{-a^2+b^2}\right)\,d\,e^3\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$
$$\left(3\,(2\,a^4-10\,a^2\,b^2-7\,b^4)\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\sqrt{e\,\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(5\,(a^2-b^2)^3\,d\,e^4\,\sqrt{\text{Sin}[c+d\,x]}\right)$$

Result (type 6, 1344 leaves):

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

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

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

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

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

$$\frac{11\,(9\,a^4-11\,a^2\,b^2+2\,b^4)\,e^{13/2}\,\mathrm{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{8\,b^{13/2}\,(-a^2+b^2)^{1/4}\,d}-\frac{11\,(9\,a^4-11\,a^2\,b^2+2\,b^4)\,e^{13/2}\,\mathrm{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{8\,b^{13/2}\,(-a^2+b^2)^{1/4}\,d}-\left(11\,a\,(9\,a^4-11\,a^2\,b^2+2\,b^4)\,e^7\,\mathrm{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(8\,b^7\left(b-\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}\right)-\left(11\,a\,(9\,a^4-11\,a^2\,b^2+2\,b^4)\,e^7\,\mathrm{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\mathrm{Sin}[c+d\,x]}\right)\Big/\left(8\,b^7\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}\right)+\frac{11\,a\,(45\,a^2-37\,b^2)\,e^6\,\mathrm{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\mathrm{Sin}[c+d\,x]}}{20\,b^6\,d\,\sqrt{\mathrm{Sin}[c+d\,x]}}-\frac{11\,e^5\,(5\,(9\,a^2-2\,b^2)-27\,a\,b\,\mathrm{Cos}[c+d\,x])\,(e\,\mathrm{Sin}[c+d\,x])^{3/2}}{60\,b^5\,d}+\frac{11\,e^3\,(9\,a+2\,b\,\mathrm{Cos}[c+d\,x])\,(e\,\mathrm{Sin}[c+d\,x])^{7/2}}{28\,b^3\,d\,(a+b\,\mathrm{Cos}[c+d\,x])}+\frac{e\,(e\,\mathrm{Sin}[c+d\,x])^{11/2}}{2\,b\,d\,(a+b\,\mathrm{Cos}[c+d\,x])^2}$$

Result (type 6, 1324 leaves):

$$\frac{1}{40\,b^5\,d\,\mathrm{Sin}[c+d\,x]^{13/2}}\,11\,(e\,\mathrm{Sin}[c+d\,x])^{13/2}\left(\frac{1}{(a+b\,\mathrm{Cos}[c+d\,x])\,(1-\mathrm{Sin}[c+d\,x]^2)}\right.$$
$$2\,(45\,a^3-37\,a\,b^2)\,\mathrm{Cos}[c+d\,x]^2\left(a+b\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)$$
$$\left(\left(a\left(-2\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)^{1/4}}\right]+2\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\mathrm{Sin}[c+d\,x]}}{(a^2-b^2)^{1/4}}\right]+\right.\right.\right.$$
$$\mathrm{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,(a^2-b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]-$$
$$\left.\left.\mathrm{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,(a^2-b^2)^{1/4}\,\sqrt{\mathrm{Sin}[c+d\,x]}+b\,\mathrm{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\,\sqrt{2}\,b^{3/2}\,(a^2-b^2)^{1/4}\right)+\left(7\,b\,(a^2-b^2)\,\mathrm{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\mathrm{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\left.\frac{b^2\,\mathrm{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\mathrm{Sin}[c+d\,x]^{3/2}\,\sqrt{1-\mathrm{Sin}[c+d\,x]^2}\right)\Big/$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\frac{19\left(a^3\,\text{Sin}[c+d x]-a b^2\,\text{Sin}[c+d x]\right)}{4 b^5\left(a+b\,\text{Cos}[c+d x]\right)}+$$

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

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

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

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

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

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

$$-\frac{9\,(7\,a^4-9\,a^2\,b^2+2\,b^4)\,e^{11/2}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{8\,b^{11/2}\,(-a^2+b^2)^{3/4}\,d}-\frac{9\,(7\,a^4-9\,a^2\,b^2+2\,b^4)\,e^{11/2}\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{(-a^2+b^2)^{1/4}\,\sqrt{e}}\right]}{8\,b^{11/2}\,(-a^2+b^2)^{3/4}\,d}+$$
$$\frac{3\,a\,(21\,a^2-13\,b^2)\,e^6\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{4\,b^6\,d\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$
$$\left(9\,a\,(7\,a^4-9\,a^2\,b^2+2\,b^4)\,e^6\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(8\,b^6\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)-$$
$$\left(9\,a\,(7\,a^4-9\,a^2\,b^2+2\,b^4)\,e^6\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(8\,b^6\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)-$$
$$\frac{3\,e^5\,(3\,(7\,a^2-2\,b^2)-7\,a\,b\,\text{Cos}[c+d\,x])\,\sqrt{e\,\text{Sin}[c+d\,x]}}{4\,b^5\,d}+$$
$$\frac{9\,e^3\,(7\,a+2\,b\,\text{Cos}[c+d\,x])\,(e\,\text{Sin}[c+d\,x])^{5/2}}{20\,b^3\,d\,(a+b\,\text{Cos}[c+d\,x])}+\frac{e\,(e\,\text{Sin}[c+d\,x])^{9/2}}{2\,b\,d\,(a+b\,\text{Cos}[c+d\,x])^2}$$

Result (type 6, 2224 leaves):

$$\frac{1}{d}\left(\frac{2\,a\,\text{Cos}[c+d\,x]}{b^4}+\frac{(-a^2+b^2)^2}{2\,b^5\,(a+b\,\text{Cos}[c+d\,x])^2}-\frac{17\,a\,(a^2-b^2)}{4\,b^5\,(a+b\,\text{Cos}[c+d\,x])}-\frac{\text{Cos}[2\,(c+d\,x)]}{5\,b^3}\right)$$
$$\text{Csc}[c+d\,x]^5\,(e\,\text{Sin}[c+d\,x])^{11/2}+$$
$$\frac{1}{40\,b^5\,d\,\text{Sin}[c+d\,x]^{11/2}}\,3\,(e\,\text{Sin}[c+d\,x])^{11/2}\left(\frac{1}{(a+b\,\text{Cos}[c+d\,x])\,(1-\text{Sin}[c+d\,x]^2)}\right.$$

$$2\left(25 a^3-37 a b^2\right) \operatorname{Cos}[c+d x]^2\left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right)$$

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

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

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

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

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

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

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

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

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

$$2\left(30 a^2 b-16 b^3\right) \operatorname{Cos}[c+d x]\left(a+b \sqrt{1-\operatorname{Sin}[c+d x]^2}\right)\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right) \sqrt{b}\right.$$

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

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

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

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

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

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

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

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

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

$$\text{Cos}[c+d\,x]\,\text{Cos}[2\,(c+d\,x)]$$
$$\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$
$$\left(\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}-\right.$$
$$\frac{\left(\frac{1}{2}-\frac{i}{2}\right)\left(-2\,a^2+b^2\right)\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]}{b^{3/2}\left(-a^2+b^2\right)^{3/4}}+\left(\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\right.$$
$$\left.\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)\Big/$$
$$\left(b^{3/2}\left(-a^2+b^2\right)^{3/4}\right)-\left(\left(\frac{1}{4}-\frac{i}{4}\right)\left(-2\,a^2+b^2\right)\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\right.\right.$$
$$\left.\left.\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)\Big/\left(b^{3/2}\left(-a^2+b^2\right)^{3/4}\right)+\frac{4\sqrt{\text{Sin}[c+d\,x]}}{b}+$$
$$\left(10\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.$$
$$\left.\left.\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)-$$
$$\left(36\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{5/2}\right)\Big/$$
$$\left(5\sqrt{1-\text{Sin}[c+d\,x]^2}\left(9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d\,x]^2,\right.$$
$$\left.\left.\left.\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)$$

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

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

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

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

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

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

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

$$\left(8\,b^5\left(b+\sqrt{-a^2+b^2}\right)d\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)-\frac{35\,a\,e^4\,\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\text{Sin}[c+d\,x]}}{4\,b^4\,d\,\sqrt{\text{Sin}[c+d\,x]}}+$$

$$\frac{7\,e^3\left(5\,a+2\,b\,\text{Cos}[c+d\,x]\right)\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}{12\,b^3\,d\left(a+b\,\text{Cos}[c+d\,x]\right)}+\frac{e\left(e\,\text{Sin}[c+d\,x]\right)^{7/2}}{2\,b\,d\left(a+b\,\text{Cos}[c+d\,x]\right)^2}$$

Result (type 6, 1231 leaves):

$$\frac{1}{d}\text{Csc}[c+d\,x]^4\left(e\,\text{Sin}[c+d\,x]\right)^{9/2}$$

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

$$\frac{1}{8\,b^3\,d\,\text{Sin}[c+d\,x]^{9/2}}\,7\left(e\,\text{Sin}[c+d\,x]\right)^{9/2}$$

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

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

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

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

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

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

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

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

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

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

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

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

Problem 81: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 4, 512 leaves, 14 steps):

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

$$\frac{15\,a\,e^4\,\mathrm{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\mathrm{Sin}[c+d\,x]}}{4\,b^4\,d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}}+$$

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

$$\left(8\,b^4\left(a^2-b\left(b-\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}\right)+$$

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

$$\left(8\,b^4\left(a^2-b\left(b+\sqrt{-a^2+b^2}\right)\right)d\,\sqrt{e\,\mathrm{Sin}[c+d\,x]}\right)+$$

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

Result (type 6, 2154 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\text{Cos}[2\,(c+d\,x)]$$

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

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

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

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

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

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

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

$$\left(10\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)-$$

$$\left(36\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{5/2}\right)\Big/\left(5\sqrt{1-\text{Sin}[c+d\,x]^2}\left(9\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{9}{4},\frac{1}{2},2,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{9}{4},\frac{3}{2},1,\frac{13}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)$$

Problem 82: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 4, 520 leaves, 14 steps):

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

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

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

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

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

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

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

Result (type 6, 1225 leaves) :

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Problem 83: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 4, 534 leaves, 14 steps):

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

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

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

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

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

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

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

Result (type 6, 1211 leaves):

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Problem 84: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 4, 529 leaves, 14 steps):

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

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

$$\left(8 b \left(a^2-b^2\right)^2 \left(b-\sqrt{-a^2+b^2}\right) d \sqrt{e \text{Sin}[c+d x]}\right)+$$

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

$$\left(8 b \left(a^2-b^2\right)^2 \left(b+\sqrt{-a^2+b^2}\right) d \sqrt{e \text{Sin}[c+d x]}\right)+$$

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

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

Result (type 6, 1232 leaves):

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

$$\frac{1}{8 (a-b)^2 (a+b)^2 d \sqrt{\text{Sin}[c+d x]}} \sqrt{e \text{Sin}[c+d x]}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Problem 85: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 4, 535 leaves, 14 steps):

$$\frac{3\sqrt{b}\,\left(5a^2+2b^2\right)\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{11/4}d\sqrt{e}}+$$

$$\frac{3\sqrt{b}\,\left(5a^2+2b^2\right)\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{11/4}d\sqrt{e}}-\frac{7\,a\,\text{EllipticF}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}}{4\left(a^2-b^2\right)^2d\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

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

Result (type 6, 1226 leaves) :

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

$$\frac{1}{8\left(a-b\right)^2\left(a+b\right)^2d\sqrt{e\,\text{Sin}[c+d\,x]}}\sqrt{\text{Sin}[c+d\,x]}$$
$$\left(-\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\left(1-\text{Sin}[c+d\,x]^2\right)}14\,a\,b\,\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\right.$$
$$\left(\left(a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\text{Log}\left[\right.\right.\right.\right.$$
$$\left.\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\right.$$
$$\left.\left.\left.\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\sqrt{2}\,\sqrt{b}\left(a^2-b^2\right)^{3/4}\right)+\left(5\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\right.\right.$$
$$\left.\left.\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/$$
$$\left(\left(-5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},-\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\right.\right.$$
$$\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},-\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\right.$$
$$\left.\left(a^2-b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)$$

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

$$\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\sqrt{1-\text{Sin}[c+d\,x]^2}}\,2\left(8\,a^2+6\,b^2\right)\text{Cos}[c+d\,x]$$
$$\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$
$$\left(-\frac{1}{\left(-a^2+b^2\right)^{3/4}}\left(\frac{1}{8}-\frac{i}{8}\right)\sqrt{b}\right.$$
$$\left(2\,\text{ArcTan}\left[1-\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{(1+i)\sqrt{b}\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]+\right.$$
$$\text{Log}\left[\sqrt{-a^2+b^2}-(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]-$$
$$\left.\left.\text{Log}\left[\sqrt{-a^2+b^2}+(1+i)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)+\right.$$
$$\left(5\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(5\left(a^2-b^2\right)\text{AppellF1}\left[\frac{1}{4},\frac{1}{2},1,\frac{5}{4},\text{Sin}[c+d\,x]^2,\right.\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{5}{4},\frac{1}{2},2,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{5}{4},\frac{3}{2},1,\frac{9}{4},\text{Sin}[c+d\,x]^2,\right.$$
$$\left.\left.\left.\left.\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)\right)$$

Problem 86: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 4, 611 leaves, 15 steps):

$$-\frac{5\,b^{3/2}\,\left(7\,a^2+2\,b^2\right)\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{8\,\left(-a^2+b^2\right)^{13/4}\,d\,e^{3/2}}+\frac{5\,b^{3/2}\,\left(7\,a^2+2\,b^2\right)\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{8\,\left(-a^2+b^2\right)^{13/4}\,d\,e^{3/2}}-$$
$$\frac{b}{2\,\left(a^2-b^2\right)\,d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$
$$\frac{9\,a\,b}{4\,\left(a^2-b^2\right)^2\,d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)\,\sqrt{e\,\text{Sin}[c+d\,x]}}+\frac{5\,b\,\left(7\,a^2+2\,b^2\right)-a\,\left(8\,a^2+37\,b^2\right)\,\text{Cos}[c+d\,x]}{4\,\left(a^2-b^2\right)^3\,d\,e\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$
$$\left(5\,a\,b\,\left(7\,a^2+2\,b^2\right)\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(8\,\left(a^2-b^2\right)^3\,\left(b-\sqrt{-a^2+b^2}\right)\,d\,e\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)-$$
$$\left(5\,a\,b\,\left(7\,a^2+2\,b^2\right)\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(8\,\left(a^2-b^2\right)^3\,\left(b+\sqrt{-a^2+b^2}\right)\,d\,e\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)-$$
$$\frac{a\,\left(8\,a^2+37\,b^2\right)\,\text{EllipticE}\left[\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{e\,\text{Sin}[c+d\,x]}}{4\,\left(a^2-b^2\right)^3\,d\,e^2\,\sqrt{\text{Sin}[c+d\,x]}}$$

Result (type 6, 1316 leaves) :

$$\left(\text{Sin}[c+d\,x]^2\,\left(-\frac{1}{\left(a^2-b^2\right)^3}2\,\left(-3\,a^2\,b-b^3+a^3\,\text{Cos}[c+d\,x]+3\,a\,b^2\,\text{Cos}[c+d\,x]\right)\,\text{Csc}[c+d\,x]+\right.\right.$$
$$\left.\left.\frac{b^3\,\text{Sin}[c+d\,x]}{2\,\left(a^2-b^2\right)^2\,\left(a+b\,\text{Cos}[c+d\,x]\right)^2}+\frac{13\,a\,b^3\,\text{Sin}[c+d\,x]}{4\,\left(a^2-b^2\right)^3\,\left(a+b\,\text{Cos}[c+d\,x]\right)}\right)\right)\Big/$$
$$\left(d\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}\right)-\frac{1}{8\,\left(a-b\right)^3\,\left(a+b\right)^3\,d\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}$$
$$\text{Sin}[c+d\,x]^{3/2}\,\left(\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\,\left(1-\text{Sin}[c+d\,x]^2\right)}\right.$$
$$2\,\left(8\,a^3\,b+37\,a\,b^3\right)\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$
$$\left(\left(\left(a\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\right.\right.\right.\right.$$
$$\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-$$
$$\left.\left.\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\,\sqrt{2}\,b^{3/2}\,\left(a^2-b^2\right)^{1/4}\right)+\left(7\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{3}{4},\,-\frac{1}{2},\,1,\,\frac{7}{4},\,\text{Sin}[c+d\,x]^2,\right.\right.$$
$$\left.\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\,\text{Sin}[c+d\,x]^{3/2}\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/$$

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

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

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

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

$$\left(8\,a^4+72\,a^2\,b^2+10\,b^4\right)\,\text{Cos}[c+d\,x]\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

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

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

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

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

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

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

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

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

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

Problem 87: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^3\,(e\,\text{Sin}[c+d\,x])^{5/2}}\,dx$$

Optimal (type 4, 629 leaves, 15 steps):

$$\frac{7\,b^{5/2}\,\left(9\,a^2+2\,b^2\right)\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{8\,\left(-a^2+b^2\right)^{15/4}\,d\,e^{5/2}}+\frac{7\,b^{5/2}\,\left(9\,a^2+2\,b^2\right)\,\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\,\sqrt{e}}\right]}{8\,\left(-a^2+b^2\right)^{15/4}\,d\,e^{5/2}}-$$
$$\frac{b}{2\,\left(a^2-b^2\right)\,d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)^2\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}-$$
$$\frac{11\,a\,b}{4\,\left(a^2-b^2\right)^2\,d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}+$$
$$\frac{7\,b\,\left(9\,a^2+2\,b^2\right)-a\,\left(8\,a^2+69\,b^2\right)\,\text{Cos}[c+d\,x]}{12\,\left(a^2-b^2\right)^3\,d\,e\,\left(e\,\text{Sin}[c+d\,x]\right)^{3/2}}+$$
$$\frac{a\,\left(8\,a^2+69\,b^2\right)\,\text{EllipticF}\left[\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}}{12\,\left(a^2-b^2\right)^3\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}}-$$
$$\left(7\,a\,b^2\,\left(9\,a^2+2\,b^2\right)\,\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(8\,\left(a^2-b^2\right)^3\,\left(a^2-b\,\left(b-\sqrt{-a^2+b^2}\right)\right)\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)-$$
$$\left(7\,a\,b^2\,\left(9\,a^2+2\,b^2\right)\,\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\,\frac{1}{2}\,\left(c-\frac{\pi}{2}+d\,x\right),\,2\right]\,\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$
$$\left(8\,\left(a^2-b^2\right)^3\,\left(a^2-b\,\left(b+\sqrt{-a^2+b^2}\right)\right)\,d\,e^2\,\sqrt{e\,\text{Sin}[c+d\,x]}\right)$$

Result (type 6, 1308 leaves):

$$\left(\left(\frac{b^3}{2\,\left(a^2-b^2\right)^2\,\left(a+b\,\text{Cos}[c+d\,x]\right)^2}+\frac{15\,a\,b^3}{4\,\left(a^2-b^2\right)^3\,\left(a+b\,\text{Cos}[c+d\,x]\right)}-\frac{1}{3\,\left(a^2-b^2\right)^3}\right.\right.$$
$$\left.\left.2\,\left(-3\,a^2\,b-b^3+a^3\,\text{Cos}[c+d\,x]+3\,a\,b^2\,\text{Cos}[c+d\,x]\right)\,\text{Csc}[c+d\,x]^2\right)\,\text{Sin}[c+d\,x]^3\right)\Big/$$
$$\left(d\,\left(e\,\text{Sin}[c+d\,x]\right)^{5/2}\right)+\frac{1}{24\,(a-b)^3\,(a+b)^3\,d\,\left(e\,\text{Sin}[c+d\,x]\right)^{5/2}}$$
$$\text{Sin}[c+d\,x]^{5/2}\,\left(\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\,\left(1-\text{Sin}[c+d\,x]^2\right)}\right.$$
$$2\,\left(8\,a^3\,b+69\,a\,b^3\right)\,\text{Cos}[c+d\,x]^2\,\left(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$
$$\left(\left(\left(a\,\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]-\right.\right.\right.\right.$$
$$\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]+$$
$$\left.\left.\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\,\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/$$
$$\left(4\,\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{3/4}\right)+\left(5\,b\,\left(a^2-b^2\right)\,\text{AppellF1}\left[\frac{1}{4},\,-\frac{1}{2},\,1,\,\frac{5}{4},\,\text{Sin}[c+d\,x]^2,\right.\right.$$

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

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

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

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

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

$$2\,\big(8\,a^4-120\,a^2\,b^2-42\,b^4\big)\,\text{Cos}[c+d\,x]\,\Big(a+b\,\sqrt{1-\text{Sin}[c+d\,x]^2}\Big)$$

$$\Big(-\frac{1}{(-a^2+b^2)^{3/4}}\Big(\frac{1}{8}-\frac{\mathrm{i}}{8}\Big)\,\sqrt{b}$$

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

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

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

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

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

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

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

$$\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\Big]\Big)\,\text{Sin}[c+d\,x]^2\Big)\,\Big(a^2+b^2\,\big(-1+\text{Sin}[c+d\,x]^2\big)\Big)\Big)\Big)$$

Problem 88: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\frac{1}{(a+b\,\text{Cos}[c+d\,x])^3\,(e\,\text{Sin}[c+d\,x])^{7/2}}\,dx$$

Optimal (type 4, 700 leaves, 16 steps):

$$-\frac{9\,b^{7/2}\left(11\,a^2+2\,b^2\right)\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{17/4}d\,e^{7/2}}+\frac{9\,b^{7/2}\left(11\,a^2+2\,b^2\right)\text{ArcTanh}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}\sqrt{e}}\right]}{8\left(-a^2+b^2\right)^{17/4}d\,e^{7/2}}-$$

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

$$\frac{13\,a\,b}{4\left(a^2-b^2\right)^2d\,e\,\left(a+b\,\text{Cos}[c+d\,x]\right)\left(e\,\text{Sin}[c+d\,x]\right)^{5/2}}+$$

$$\frac{9\,b\left(11\,a^2+2\,b^2\right)-a\left(8\,a^2+109\,b^2\right)\text{Cos}[c+d\,x]}{20\left(a^2-b^2\right)^3d\,e\,\left(e\,\text{Sin}[c+d\,x]\right)^{5/2}}-$$

$$\frac{3\left(15\,b^3\left(11\,a^2+2\,b^2\right)+a\left(8\,a^4-64\,a^2\,b^2-139\,b^4\right)\text{Cos}[c+d\,x]\right)}{20\left(a^2-b^2\right)^4d\,e^3\sqrt{e\,\text{Sin}[c+d\,x]}}+$$

$$\left(9\,a\,b^3\left(11\,a^2+2\,b^2\right)\text{EllipticPi}\left[\frac{2\,b}{b-\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$

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

$$\left(9\,a\,b^3\left(11\,a^2+2\,b^2\right)\text{EllipticPi}\left[\frac{2\,b}{b+\sqrt{-a^2+b^2}},\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{\text{Sin}[c+d\,x]}\right)\Big/$$

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

$$\left(3\,a\left(8\,a^4-64\,a^2\,b^2-139\,b^4\right)\text{EllipticE}\left[\frac{1}{2}\left(c-\frac{\pi}{2}+d\,x\right),2\right]\sqrt{e\,\text{Sin}[c+d\,x]}\right)\Big/$$

$$\left(20\left(a^2-b^2\right)^4d\,e^4\sqrt{\text{Sin}[c+d\,x]}\right)$$

Result (type 6, 1408 leaves):

$$\left(\text{Sin}[c+d\,x]^4\right.$$

$$\left(-\frac{1}{5\left(a^2-b^2\right)^4}2\left(50\,a^2\,b^3+10\,b^5+3\,a^5\,\text{Cos}[c+d\,x]-24\,a^3\,b^2\,\text{Cos}[c+d\,x]-39\,a\,b^4\,\text{Cos}[c+d\,x]\right)\right.$$

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

$$\left.\left.\text{Csc}[c+d\,x]^3-\frac{b^5\,\text{Sin}[c+d\,x]}{2\left(a^2-b^2\right)^3\left(a+b\,\text{Cos}[c+d\,x]\right)^2}-\frac{21\,a\,b^5\,\text{Sin}[c+d\,x]}{4\left(a^2-b^2\right)^4\left(a+b\,\text{Cos}[c+d\,x]\right)}\right)\right)\Big/$$

$$\left(d\left(e\,\text{Sin}[c+d\,x]\right)^{7/2}\right)-\frac{1}{40\left(a-b\right)^4\left(a+b\right)^4d\left(e\,\text{Sin}[c+d\,x]\right)^{7/2}}$$

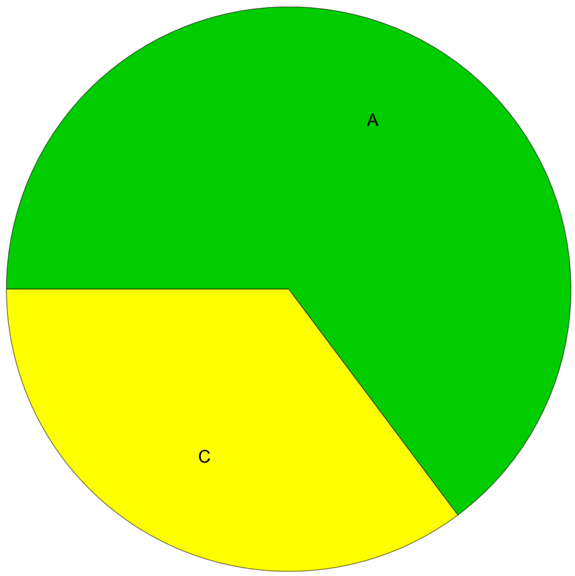
$$3\,\text{Sin}[c+d\,x]^{7/2}\left(\frac{1}{\left(a+b\,\text{Cos}[c+d\,x]\right)\left(1-\text{Sin}[c+d\,x]^2\right)}\right.$$

$$2\left(8\,a^5\,b-64\,a^3\,b^3-139\,a\,b^5\right)\text{Cos}[c+d\,x]^2\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)$$

$$\left(\left(a\left(-2\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+2\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(a^2-b^2\right)^{1/4}}\right]+\text{Log}\left[\sqrt{a^2-b^2}-\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]-\text{Log}\left[\sqrt{a^2-b^2}+\sqrt{2}\,\sqrt{b}\,\left(a^2-b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/\left(4\sqrt{2}\,b^{3/2}\left(a^2-b^2\right)^{1/4}\right)+\left(7\,b\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\Big/\left(3\left(-7\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},-\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},-\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(a^2-b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)+\frac{1}{12\left(a+b\,\text{Cos}[c+d\,x]\right)\sqrt{1-\text{Sin}[c+d\,x]^2}}\left(8\,a^6-64\,a^4\,b^2-304\,a^2\,b^4-30\,b^6\right)\text{Cos}[c+d\,x]\left(a+b\sqrt{1-\text{Sin}[c+d\,x]^2}\right)\left(\left(\left(3+3\,i\right)\left(2\,\text{ArcTan}\left[1-\frac{\left(1+i\right)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-2\,\text{ArcTan}\left[1+\frac{\left(1+i\right)\sqrt{b}\,\sqrt{\text{Sin}[c+d\,x]}}{\left(-a^2+b^2\right)^{1/4}}\right]-\text{Log}\left[\sqrt{-a^2+b^2}-\left(1+i\right)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]+\text{Log}\left[\sqrt{-a^2+b^2}+\left(1+i\right)\sqrt{b}\left(-a^2+b^2\right)^{1/4}\sqrt{\text{Sin}[c+d\,x]}+i\,b\,\text{Sin}[c+d\,x]\right]\right)\right)\Big/\left(\sqrt{b}\left(-a^2+b^2\right)^{1/4}\right)+\left(56\,a\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\text{Sin}[c+d\,x]^{3/2}\right)\Big/\left(\sqrt{1-\text{Sin}[c+d\,x]^2}\left(7\left(a^2-b^2\right)\text{AppellF1}\left[\frac{3}{4},\frac{1}{2},1,\frac{7}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]-2\left(2\,b^2\,\text{AppellF1}\left[\frac{7}{4},\frac{1}{2},2,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]+\left(-a^2+b^2\right)\text{AppellF1}\left[\frac{7}{4},\frac{3}{2},1,\frac{11}{4},\text{Sin}[c+d\,x]^2,\frac{b^2\,\text{Sin}[c+d\,x]^2}{-a^2+b^2}\right]\right)\text{Sin}[c+d\,x]^2\right)\left(a^2+b^2\left(-1+\text{Sin}[c+d\,x]^2\right)\right)\right)\right)$$

Summary of Integration Test Results

88 integration problems



A - 57 optimal antiderivatives

B - 0 more than twice size of optimal antiderivatives

C - 31 unnecessarily complex antiderivatives

D - 0 unable to integrate problems

E - 0 integration timeouts