Mathematica 11.3 Integration Test Results

on the problems in the test-suite directory "5 Inverse trig functions\5.2 Inverse cosine"

Test results for the 227 problems in "5.2.2 (d x)^m (a+b arccos(c x))^n.m"

Problem 30: Result more than twice size of optimal antiderivative.

$$\int \frac{\text{ArcCos}[a x]^3}{x^4} \, dx$$

Optimal (type 4, 192 leaves, 14 steps):

$$-\frac{a^2 \text{ArcCos}[a x]}{x}+\frac{a \sqrt{1-a^2 x^2} \text{ArcCos}[a x]^2}{2 x^2}-\frac{\text{ArcCos}[a x]^3}{3 x^3}-$$
$$i a^3 \text{ArcCos}[a x]^2 \text{ArcTan}\left[e^{i \text{ArcCos}[a x]}\right]+a^3 \text{ArcTanh}\left[\sqrt{1-a^2 x^2}\right]+i a^3 \text{ArcCos}[a x] \text{PolyLog}\left[2,-i e^{i \text{ArcCos}[a x]}\right]-$$
$$i a^3 \text{ArcCos}[a x] \text{PolyLog}\left[2, i e^{i \text{ArcCos}[a x]}\right]-a^3 \text{PolyLog}\left[3,-i e^{i \text{ArcCos}[a x]}\right]+a^3 \text{PolyLog}\left[3, i e^{i \text{ArcCos}[a x]}\right]$$

Result (type 4, 509 leaves):

$$\frac{1}{2} a^3 \Big(\text{ArcCos}[a x]^2 \text{Log}\big[1 - i e^{i \text{ArcCos}[a x]}\big] - \text{ArcCos}[a x]^2 \text{Log}\big[1 + i e^{i \text{ArcCos}[a x]}\big] + \pi \text{ArcCos}[a x] \text{Log}\Big[\Big(-\frac{1}{2} - \frac{i}{2}\Big) e^{-\frac{1}{2} i \text{ArcCos}[a x]} \big(-i + e^{i \text{ArcCos}[a x]}\big)\Big] -$$
$$\text{ArcCos}[a x]^2 \text{Log}\Big[\Big(\frac{1}{2} + \frac{i}{2}\Big) e^{-\frac{1}{2} i \text{ArcCos}[a x]} \big(-i + e^{i \text{ArcCos}[a x]}\big)\Big] + \pi \text{ArcCos}[a x] \text{Log}\Big[\frac{1}{2} e^{-\frac{1}{2} i \text{ArcCos}[a x]} \big((1+i) + (1-i) e^{i \text{ArcCos}[a x]}\big)\Big] +$$
$$\text{ArcCos}[a x]^2 \text{Log}\Big[\frac{1}{2} e^{-\frac{1}{2} i \text{ArcCos}[a x]} \big((1+i) + (1-i) e^{i \text{ArcCos}[a x]}\big)\Big] - 2 \text{Log}\Big[\text{Cos}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big] - \text{Sin}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big]\Big] +$$
$$\text{ArcCos}[a x]^2 \text{Log}\Big[\text{Cos}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big] - \text{Sin}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big]\Big] - \pi \text{ArcCos}[a x] \text{Log}\Big[-\text{Cos}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big] + \text{Sin}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big]\Big] +$$
$$2 \text{Log}\Big[\text{Cos}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big] + \text{Sin}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big]\Big] - \pi \text{ArcCos}[a x] \text{Log}\Big[\text{Cos}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big] + \text{Sin}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big]\Big] -$$
$$\text{ArcCos}[a x]^2 \text{Log}\Big[\text{Cos}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big] + \text{Sin}\Big[\frac{1}{2} \text{ArcCos}[a x]\Big]\Big] + 2 i \text{ArcCos}[a x] \text{PolyLog}\big[2, -i e^{i \text{ArcCos}[a x]}\big] -$$
$$2 i \text{ArcCos}[a x] \text{PolyLog}\big[2, i e^{i \text{ArcCos}[a x]}\big] - 2 \text{PolyLog}\big[3, -i e^{i \text{ArcCos}[a x]}\big] + 2 \text{PolyLog}\big[3, i e^{i \text{ArcCos}[a x]}\big]\Big) -$$
$$\frac{\text{ArcCos}[a x] \big(12 a^2 x^2 + 4 \text{ArcCos}[a x]^2 - 3 \text{ArcCos}[a x] \text{Sin}[2 \text{ArcCos}[a x]]\big)}{12 x^3}$$

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

$$\int \frac{\text{ArcCos}[a x]^4}{x^2} \, dx$$

Optimal (type 4, 176 leaves, 11 steps):

$$-\frac{\text{ArcCos}[a x]^4}{x} - 8 i a \text{ArcCos}[a x]^3 \text{ArcTan}\big[e^{i \text{ArcCos}[a x]}\big] + 12 i a \text{ArcCos}[a x]^2 \text{PolyLog}\big[2, -i e^{i \text{ArcCos}[a x]}\big] -$$
$$12 i a \text{ArcCos}[a x]^2 \text{PolyLog}\big[2, i e^{i \text{ArcCos}[a x]}\big] - 24 a \text{ArcCos}[a x] \text{PolyLog}\big[3, -i e^{i \text{ArcCos}[a x]}\big] +$$
$$24 a \text{ArcCos}[a x] \text{PolyLog}\big[3, i e^{i \text{ArcCos}[a x]}\big] - 24 i a \text{PolyLog}\big[4, -i e^{i \text{ArcCos}[a x]}\big] + 24 i a \text{PolyLog}\big[4, i e^{i \text{ArcCos}[a x]}\big]$$

Result (type 4, 549 leaves):

$$a\left(-\frac{7\,i\,\pi^4}{16}-\frac{1}{2}\,i\,\pi^3\,\text{ArcCos}[a\,x]+\frac{3}{2}\,i\,\pi^2\,\text{ArcCos}[a\,x]^2-2\,i\,\pi\,\text{ArcCos}[a\,x]^3+i\,\text{ArcCos}[a\,x]^4-\frac{\text{ArcCos}[a\,x]^4}{a\,x}+3\,\pi^2\,\text{ArcCos}[a\,x]\,\text{Log}\left[1-i\,e^{-i\,\text{ArcCos}[a\,x]}\right]-6\,\pi\,\text{ArcCos}[a\,x]^2\,\text{Log}\left[1-i\,e^{-i\,\text{ArcCos}[a\,x]}\right]-\frac{1}{2}\,\pi^3\,\text{Log}\left[1+i\,e^{-i\,\text{ArcCos}[a\,x]}\right]+4\,\text{ArcCos}[a\,x]^3\,\text{Log}\left[1+i\,e^{-i\,\text{ArcCos}[a\,x]}\right]+\frac{1}{2}\,\pi^3\,\text{Log}\left[1+i\,e^{i\,\text{ArcCos}[a\,x]}\right]-3\,\pi^2\,\text{ArcCos}[a\,x]\,\text{Log}\left[1+i\,e^{i\,\text{ArcCos}[a\,x]}\right]+6\,\pi\,\text{ArcCos}[a\,x]^2\,\text{Log}\left[1+i\,e^{i\,\text{ArcCos}[a\,x]}\right]-4\,\text{ArcCos}[a\,x]^3\,\text{Log}\left[1+i\,e^{i\,\text{ArcCos}[a\,x]}\right]+\frac{1}{2}\,\pi^3\,\text{Log}\left[\text{Tan}\left[\frac{1}{4}\,(\pi+2\,\text{ArcCos}[a\,x])\right]\right]+12\,i\,\text{ArcCos}[a\,x]^2\,\text{PolyLog}\left[2,-i\,e^{-i\,\text{ArcCos}[a\,x]}\right]+3\,i\,\pi\,(\pi-4\,\text{ArcCos}[a\,x])\,\text{PolyLog}\left[2,i\,e^{-i\,\text{ArcCos}[a\,x]}\right]+3\,i\,\pi^2\,\text{PolyLog}\left[2,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]-12\,i\,\pi\,\text{ArcCos}[a\,x]\,\text{PolyLog}\left[2,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]+12\,i\,\text{ArcCos}[a\,x]^2\,\text{PolyLog}\left[2,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]+24\,\text{ArcCos}[a\,x]\,\text{PolyLog}\left[3,-i\,e^{-i\,\text{ArcCos}[a\,x]}\right]-12\,\pi\,\text{PolyLog}\left[3,i\,e^{-i\,\text{ArcCos}[a\,x]}\right]+12\,\pi\,\text{PolyLog}\left[3,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]-24\,\text{ArcCos}[a\,x]\,\text{PolyLog}\left[3,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]-24\,i\,\text{PolyLog}\left[4,-i\,e^{-i\,\text{ArcCos}[a\,x]}\right]-24\,i\,\text{PolyLog}\left[4,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]\right)$$

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

$$\int\frac{\text{ArcCos}[a\,x]^4}{x^4}\,dx$$

Optimal (type 4, 304 leaves, 19 steps):

$$-\frac{2\,a^2\,\text{ArcCos}[a\,x]^2}{x}+\frac{2\,a\,\sqrt{1-a^2\,x^2}\,\text{ArcCos}[a\,x]^3}{3\,x^2}-\frac{\text{ArcCos}[a\,x]^4}{3\,x^3}-8\,i\,a^3\,\text{ArcCos}[a\,x]\,\text{ArcTan}\left[e^{i\,\text{ArcCos}[a\,x]}\right]-\frac{4}{3}\,i\,a^3\,\text{ArcCos}[a\,x]^3\,\text{ArcTan}\left[e^{i\,\text{ArcCos}[a\,x]}\right]+4\,i\,a^3\,\text{PolyLog}\left[2,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]+2\,i\,a^3\,\text{ArcCos}[a\,x]^2\,\text{PolyLog}\left[2,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]-4\,i\,a^3\,\text{PolyLog}\left[2,i\,e^{i\,\text{ArcCos}[a\,x]}\right]-2\,i\,a^3\,\text{ArcCos}[a\,x]^2\,\text{PolyLog}\left[2,i\,e^{i\,\text{ArcCos}[a\,x]}\right]-4\,a^3\,\text{ArcCos}[a\,x]\,\text{PolyLog}\left[3,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]+4\,a^3\,\text{ArcCos}[a\,x]\,\text{PolyLog}\left[3,i\,e^{i\,\text{ArcCos}[a\,x]}\right]-4\,i\,a^3\,\text{PolyLog}\left[4,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]+4\,i\,a^3\,\text{PolyLog}\left[4,i\,e^{i\,\text{ArcCos}[a\,x]}\right]$$

Result (type 4, 1475 leaves):

$$a^3\left(-\frac{1}{6}\,\text{ArcCos}[a\,x]^2\,\left(12+\text{ArcCos}[a\,x]^2\right)+4\,\left(\text{ArcCos}[a\,x]\,\left(\text{Log}\left[1-i\,e^{i\,\text{ArcCos}[a\,x]}\right]-\text{Log}\left[1+i\,e^{i\,\text{ArcCos}[a\,x]}\right]\right)+i\,\left(\text{PolyLog}\left[2,-i\,e^{i\,\text{ArcCos}[a\,x]}\right]-\text{PolyLog}\left[2,i\,e^{i\,\text{ArcCos}[a\,x]}\right]\right)\right)+\frac{2}{3}\left(\frac{1}{8}\,\pi^3\,\text{Log}\left[\text{Cot}\left[\frac{1}{2}\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)\right]\right]+\frac{3}{4}\,\pi^2\left(\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)\left(\text{Log}\left[1-e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]-\text{Log}\left[1+e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]\right)+i\left(\text{PolyLog}\left[2,-e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]-\text{PolyLog}\left[2,e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]\right)\right)-\frac{3}{2}\,\pi\left(\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)^2\left(\text{Log}\left[1-e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]-\text{Log}\left[1+e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]\right)+2\,i\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)\left(\text{PolyLog}\left[2,-e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]-\text{PolyLog}\left[2,e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]\right)+2\left(-\text{PolyLog}\left[3,-e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]+\text{PolyLog}\left[3,e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]\right)\right)+8\left(\frac{1}{64}\,i\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)^4+\frac{1}{4}\,i\left(\frac{\pi}{2}+\frac{1}{2}\left(-\frac{\pi}{2}+\text{ArcCos}[a\,x]\right)\right)^4-\frac{1}{8}\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)^3\,\text{Log}\left[1+e^{i\,\left(\frac{\pi}{2}-\text{ArcCos}[a\,x]\right)}\right]-\right.$$

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

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

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

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

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

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

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

$$\frac{-4\,\text{ArcCos}[a\,x]^3+\text{ArcCos}[a\,x]^4}{12\left(\text{Cos}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]\right)^2}-\frac{\text{ArcCos}[a\,x]^4\,\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]}{6\left(\text{Cos}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]\right)^3}+$$

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

$$\frac{4\,\text{ArcCos}[a\,x]^3+\text{ArcCos}[a\,x]^4}{12\left(\text{Cos}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]\right)^2}-$$

$$\frac{-12\,\text{ArcCos}[a\,x]^2\,\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]-\text{ArcCos}[a\,x]^4\,\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]}{6\left(\text{Cos}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]\right)}-$$

$$\left.\frac{12\,\text{ArcCos}[a\,x]^2\,\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]+\text{ArcCos}[a\,x]^4\,\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]}{6\left(\text{Cos}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\text{ArcCos}[a\,x]\right]\right)}\right)$$

Problem 121: Unable to integrate problem.

$$\int(b\,x)^m\,\text{ArcCos}[a\,x]^2\,dx$$

Optimal (type 5, 150 leaves, 2 steps) :

$$\frac{(b x)^{1+m} \text{ArcCos}[a x]^2}{b (1+m)} + \frac{2 a (b x)^{2+m} \text{ArcCos}[a x] \text{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, a^2 x^2\right]}{b^2 (1+m) (2+m)} + \frac{2 a^2 (b x)^{3+m} \text{HypergeometricPFQ}\left[\left\{1, \frac{3}{2}+\frac{m}{2}, \frac{3}{2}+\frac{m}{2}\right\}, \left\{2+\frac{m}{2}, \frac{5}{2}+\frac{m}{2}\right\}, a^2 x^2\right]}{b^3 (1+m) (2+m) (3+m)}$$

Result (type 8, 14 leaves):

$$\int (b x)^m \text{ArcCos}[a x]^2 \, dx$$

Problem 157: Result more than twice size of optimal antiderivative.

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

Optimal (type 4, 151 leaves, 9 steps):

$$-\frac{(a+b \text{ArcCos}[c x])^3}{x} - 6 i b c (a+b \text{ArcCos}[c x])^2 \text{ArcTan}\left[e^{i \text{ArcCos}[c x]}\right] + 6 i b^2 c (a+b \text{ArcCos}[c x]) \text{PolyLog}\left[2, -i e^{i \text{ArcCos}[c x]}\right] - 6 i b^2 c (a+b \text{ArcCos}[c x]) \text{PolyLog}\left[2, i e^{i \text{ArcCos}[c x]}\right] - 6 b^3 c \text{PolyLog}\left[3, -i e^{i \text{ArcCos}[c x]}\right] + 6 b^3 c \text{PolyLog}\left[3, i e^{i \text{ArcCos}[c x]}\right]$$

Result (type 4, 308 leaves):

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

Problem 203: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 4, 120 leaves, 5 steps):

$$-\frac{20 b d^2 \sqrt{d x} \sqrt{1-c^2 x^2}}{147 c^3} - \frac{4 b (d x)^{5/2} \sqrt{1-c^2 x^2}}{49 c} + \frac{2 (d x)^{7/2} (a+b \text{ArcCos}[c x])}{7 d} + \frac{20 b d^{5/2} \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{c} \sqrt{d x}}{\sqrt{d}}\right], -1\right]}{147 c^{7/2}}$$

Result (type 4, 158 leaves):

$$\frac{1}{147\, c^3 \sqrt{1-c^2 x^2}} 2\, d^2 \sqrt{d\, x} \left(-10\, b+4\, b\, c^2 x^2+6\, b\, c^4 x^4+21\, a\, c^3 x^3 \sqrt{1-c^2 x^2}+21\, b\, c^3 x^3 \sqrt{1-c^2 x^2}\, \text{ArcCos}[c\, x]+\frac{10\, i\, b \sqrt{1-\frac{1}{c^2 x^2}} \sqrt{x}\, \text{EllipticF}\left[i\, \text{ArcSinh}\left[\frac{\sqrt{-\frac{1}{c}}}{\sqrt{x}}\right],-1\right]}{\sqrt{-\frac{1}{c}}}\right)$$

Problem 204: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 4, 124 leaves, 7 steps):

$$-\frac{4\, b\, (d\, x)^{3/2} \sqrt{1-c^2 x^2}}{25\, c}+\frac{2\, (d\, x)^{5/2} (a+b\, \text{ArcCos}[c\, x])}{5\, d}+\frac{12\, b\, d^{3/2}\, \text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{c}\, \sqrt{d\, x}}{\sqrt{d}}\right],-1\right]}{25\, c^{5/2}}-\frac{12\, b\, d^{3/2}\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{c}\, \sqrt{d\, x}}{\sqrt{d}}\right],-1\right]}{25\, c^{5/2}}$$

Result (type 4, 107 leaves):

$$\frac{1}{25\, c^2 \sqrt{-c\, x}} 2\, d \sqrt{d\, x} \left(c\, x \sqrt{-c\, x} \left(5\, a\, c\, x-2\, b \sqrt{1-c^2 x^2}+5\, b\, c\, x\, \text{ArcCos}[c\, x]\right)-6\, i\, b\, \text{EllipticE}\left[i\, \text{ArcSinh}\left[\sqrt{-c\, x}\right],-1\right]+6\, i\, b\, \text{EllipticF}\left[i\, \text{ArcSinh}\left[\sqrt{-c\, x}\right],-1\right]\right)$$

Problem 205: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 4, 88 leaves, 4 steps):

$$-\frac{4\, b \sqrt{d\, x} \sqrt{1-c^2 x^2}}{9\, c}+\frac{2\, (d\, x)^{3/2} (a+b\, \text{ArcCos}[c\, x])}{3\, d}+\frac{4\, b \sqrt{d}\, \text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{c}\, \sqrt{d\, x}}{\sqrt{d}}\right],-1\right]}{9\, c^{3/2}}$$

Result (type 4, 113 leaves):

$$\frac{2}{9}\sqrt{d\,x}\left(3\,a\,x-\frac{2\,b\,\sqrt{1-c^2\,x^2}}{c}+3\,b\,x\,\text{ArcCos}[c\,x]-\frac{2\,i\,b\,\sqrt{-\frac{1}{c}}\,\sqrt{1-\frac{1}{c^2\,x^2}}\,\sqrt{x}\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\frac{\sqrt{-\frac{1}{c}}}{\sqrt{x}}\right],-1\right]}{\sqrt{1-c^2\,x^2}}\right)$$

Problem 206: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 4, 89 leaves, 6 steps):

$$\frac{2\,\sqrt{d\,x}\,\left(a+b\,\text{ArcCos}[c\,x]\right)}{d}+\frac{4\,b\,\text{EllipticE}\left[\text{ArcSin}\left[\frac{\sqrt{c}\,\sqrt{d\,x}}{\sqrt{d}}\right],-1\right]}{\sqrt{c}\,\sqrt{d}}-\frac{4\,b\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{c}\,\sqrt{d\,x}}{\sqrt{d}}\right],-1\right]}{\sqrt{c}\,\sqrt{d}}$$

Result (type 4, 76 leaves):

$$\frac{1}{\sqrt{-c\,x}\,\sqrt{d\,x}}2\,x\,\left(\sqrt{-c\,x}\,\left(a+b\,\text{ArcCos}[c\,x]\right)-2\,i\,b\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-c\,x}\right],-1\right]+2\,i\,b\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-c\,x}\right],-1\right]\right)$$

Problem 207: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 4, 55 leaves, 3 steps):

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

Result (type 4, 93 leaves):

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

Problem 208: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 4, 125 leaves, 7 steps):

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

Result (type 4, 110 leaves):

$$\frac{1}{3\,\sqrt{-c\,x}\,(d\,x)^{5/2}}$$
$$x\left(-2\,\sqrt{-c\,x}\,\left(a-2\,b\,c\,x\,\sqrt{1-c^2\,x^2}+b\,\text{ArcCos}[c\,x]\right)-4\,i\,b\,c^2\,x^2\,\text{EllipticE}\left[i\,\text{ArcSinh}\left[\sqrt{-c\,x}\right],-1\right]+4\,i\,b\,c^2\,x^2\,\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{-c\,x}\right],-1\right]\right)$$

Problem 209: Result more than twice size of optimal antiderivative.

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

Optimal (type 5, 109 leaves, 2 steps):

$$\frac{2\,(d\,x)^{7/2}\,(a+b\,\text{ArcCos}[c\,x])^2}{7\,d}+\frac{8\,b\,c\,(d\,x)^{9/2}\,(a+b\,\text{ArcCos}[c\,x])\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{9}{4},\frac{13}{4},c^2\,x^2\right]}{63\,d^2}+$$
$$\frac{16\,b^2\,c^2\,(d\,x)^{11/2}\,\text{HypergeometricPFQ}\left[\left\{1,\frac{11}{4},\frac{11}{4}\right\},\left\{\frac{13}{4},\frac{15}{4}\right\},c^2\,x^2\right]}{693\,d^3}$$

Result (type 5, 269 leaves):

$$\frac{1}{6174}(d\,x)^{5/2}\left(1764\,a^2\,x+168\,a\,b\left(21\,x\,\text{ArcCos}[c\,x]+\frac{2\,x\left(\sqrt{c\,x}\,\left(-5+2\,c^2\,x^2+3\,c^4\,x^4\right)-5\,c\,\sqrt{1-\frac{1}{c^2\,x^2}}\,x\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{\sqrt{c\,x}}\right],-1\right]\right)}{(c\,x)^{7/2}\,\sqrt{1-c^2\,x^2}}\right)+\right.$$

$$\frac{1}{c^3\,x^2\,\text{Gamma}\left[\frac{5}{4}\right]\,\text{Gamma}\left[\frac{7}{4}\right]}b^2\left(4\,\text{Gamma}\left[\frac{5}{4}\right]\,\text{Gamma}\left[\frac{7}{4}\right]\left(-8\,c\,x\left(35+9\,c^2\,x^2\right)-84\,\sqrt{1-c^2\,x^2}\,\left(5+3\,c^2\,x^2\right)\,\text{ArcCos}[c\,x]+441\,c^3\,x^3\,\text{ArcCos}[c\,x]^2+\right.\right.$$

$$\left.\left.\left.420\,\sqrt{1-c^2\,x^2}\,\text{ArcCos}[c\,x]\,\text{Hypergeometric2F1}\left[\frac{3}{4},1,\frac{5}{4},c^2\,x^2\right]\right)+210\,\sqrt{2}\,c\,\pi\,x\,\text{HypergeometricPFQ}\left[\left\{\frac{3}{4},\frac{3}{4},1\right\},\left\{\frac{5}{4},\frac{7}{4}\right\},c^2\,x^2\right]\right)\right)$$

Problem 211: Result more than twice size of optimal antiderivative.

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

Optimal (type 5, 109 leaves, 2 steps):

$$\frac{2\,(d\,x)^{3/2}\,\left(a+b\,\text{ArcCos}[c\,x]\right)^2}{3\,d}+\frac{8\,b\,c\,(d\,x)^{5/2}\,\left(a+b\,\text{ArcCos}[c\,x]\right)\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{5}{4},\frac{9}{4},c^2\,x^2\right]}{15\,d^2}+$$

$$\frac{16\,b^2\,c^2\,(d\,x)^{7/2}\,\text{HypergeometricPFQ}\left[\left\{1,\frac{7}{4},\frac{7}{4}\right\},\left\{\frac{9}{4},\frac{11}{4}\right\},c^2\,x^2\right]}{105\,d^3}$$

Result (type 5, 228 leaves):

$$\frac{1}{27}\sqrt{d\,x}\left(18\,a^2\,x+36\,a\,b\,x\,\text{ArcCos}[c\,x]-\frac{24\,b^2\sqrt{1-c^2x^2}\,\text{ArcCos}[c\,x]}{c}+\right.$$

$$2\,b^2\,x\left(-8+9\,\text{ArcCos}[c\,x]^2\right)+\frac{24\,a\,b\,x\left(-\sqrt{c\,x}+(c\,x)^{5/2}-c\sqrt{1-\frac{1}{c^2x^2}}\;x\,\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{\sqrt{c\,x}}\right],-1\right]\right)}{(c\,x)^{3/2}\sqrt{1-c^2x^2}}+$$

$$\left.\frac{24\,b^2\sqrt{1-c^2x^2}\,\text{ArcCos}[c\,x]\,\text{Hypergeometric2F1}\left[\frac{3}{4},1,\frac{5}{4},c^2x^2\right]}{c}+\frac{3\sqrt{2}\,b^2\,\pi\,x\,\text{HypergeometricPFQ}\left[\left\{\frac{3}{4},\frac{3}{4},1\right\},\left\{\frac{5}{4},\frac{7}{4}\right\},c^2x^2\right]}{\text{Gamma}\left[\frac{5}{4}\right]\text{Gamma}\left[\frac{7}{4}\right]}\right)$$

Problem 214: Result more than twice size of optimal antiderivative.

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

Optimal (type 5, 109 leaves, 2 steps):

$$-\frac{2\,(a+b\,\text{ArcCos}[c\,x])^2}{3\,d\,(d\,x)^{3/2}}+\frac{8\,b\,c\,(a+b\,\text{ArcCos}[c\,x])\,\text{Hypergeometric2F1}\left[-\frac{1}{4},\frac{1}{2},\frac{3}{4},c^2x^2\right]}{3\,d^2\sqrt{d\,x}}+$$

$$\frac{16\,b^2\,c^2\sqrt{d\,x}\,\text{HypergeometricPFQ}\left[\left\{\frac{1}{4},\frac{1}{4},1\right\},\left\{\frac{3}{4},\frac{5}{4}\right\},c^2x^2\right]}{3\,d^3}$$

Result (type 5, 242 leaves):

$$\frac{1}{36\,(d\,x)^{5/2}\,\text{Gamma}\left[\frac{7}{4}\right]\text{Gamma}\left[\frac{9}{4}\right]}$$

$$x\left(-8\,\text{Gamma}\left[\frac{7}{4}\right]\text{Gamma}\left[\frac{9}{4}\right]\left(3\,a^2-24\,b^2\,c^2\,x^2-12\,a\,b\,c\,x\sqrt{1-c^2x^2}+6\,a\,b\,\text{ArcCos}[c\,x]-12\,b^2\,c\,x\sqrt{1-c^2x^2}\,\text{ArcCos}[c\,x]+\right.\right.$$

$$3\,b^2\,\text{ArcCos}[c\,x]^2-12\,a\,b\,(c\,x)^{3/2}\,\text{EllipticE}\left[\text{ArcSin}\left[\sqrt{c\,x}\right],-1\right]+12\,a\,b\,(c\,x)^{3/2}\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{c\,x}\right],-1\right]-$$

$$\left.\left.4\,b^2\,c^3\,x^3\sqrt{1-c^2x^2}\,\text{ArcCos}[c\,x]\,\text{Hypergeometric2F1}\left[1,\frac{5}{4},\frac{7}{4},c^2x^2\right]\right)+3\sqrt{2}\,b^2\,c^4\,\pi\,x^4\,\text{HypergeometricPFQ}\left[\left\{1,\frac{5}{4},\frac{5}{4}\right\},\left\{\frac{7}{4},\frac{9}{4}\right\},c^2x^2\right]\right)$$

Problem 216: Attempted integration timed out after 120 seconds.

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

Optimal (type 9, 66 leaves, 1 step):

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

Result (type 1, 1 leaves):

???

Test results for the 33 problems in "5.2.4 (f x)^m (d+e x^2)^p (a+b arccos(c x))^n.m"

Problem 5: Result more than twice size of optimal antiderivative.

$$\int \frac{a+b\,\text{ArcCos}[c\,x]}{x\,\left(d-c^2\,d\,x^2\right)}\,dx$$

Optimal (type 4, 71 leaves, 7 steps):

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

Result (type 4, 143 leaves):

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

Problem 31: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

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

Optimal (type 3, 66 leaves, 6 steps):

$$\frac{x\,\text{ArcCos}[a\,x]}{c\,\sqrt{c+d\,x^2}}-\frac{\text{ArcTan}\left[\frac{\sqrt{d}\,\sqrt{1-a^2\,x^2}}{a\,\sqrt{c+d\,x^2}}\right]}{c\,\sqrt{d}}$$

Result (type 6, 159 leaves):

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

Problem 32: Result unnecessarily involves higher level functions.

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

Optimal (type 3, 136 leaves, 7 steps):

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

Result (type 6, 216 leaves):

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

Problem 33: Result unnecessarily involves higher level functions.

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

Optimal (type 3, 211 leaves, 8 steps):

$$-\frac{a\sqrt{1-a^2x^2}}{15c\left(a^2c+d\right)\left(c+dx^2\right)^{3/2}}-\frac{2a\left(3a^2c+2d\right)\sqrt{1-a^2x^2}}{15c^2\left(a^2c+d\right)^2\sqrt{c+dx^2}}+\frac{x\,\text{ArcCos}[a\,x]}{5c\left(c+dx^2\right)^{5/2}}+\frac{4x\,\text{ArcCos}[a\,x]}{15c^2\left(c+dx^2\right)^{3/2}}+\frac{8x\,\text{ArcCos}[a\,x]}{15c^3\sqrt{c+dx^2}}-\frac{8\,\text{ArcTan}\left[\frac{\sqrt{d}\sqrt{1-a^2x^2}}{a\sqrt{c+dx^2}}\right]}{15c^3\sqrt{d}}$$

Result (type 6, 277 leaves) :

$$\frac{1}{15c^3\left(c+dx^2\right)^{5/2}}\left(-\frac{ac^2\sqrt{1-a^2x^2}\left(c+dx^2\right)}{a^2c+d}-\frac{2ac\left(3a^2c+2d\right)\sqrt{1-a^2x^2}\left(c+dx^2\right)^2}{\left(a^2c+d\right)^2}+\right.$$
$$\left(16acx^2\left(c+dx^2\right)^2\text{AppellF1}\left[1,\frac{1}{2},\frac{1}{2},2,a^2x^2,-\frac{dx^2}{c}\right]\right)\Big/\left(\sqrt{1-a^2x^2}\left(4c\,\text{AppellF1}\left[1,\frac{1}{2},\frac{1}{2},2,a^2x^2,-\frac{dx^2}{c}\right]+\right.\right.$$
$$\left.\left.\left.x^2\left(-d\,\text{AppellF1}\left[2,\frac{1}{2},\frac{3}{2},3,a^2x^2,-\frac{dx^2}{c}\right]+a^2c\,\text{AppellF1}\left[2,\frac{3}{2},\frac{1}{2},3,a^2x^2,-\frac{dx^2}{c}\right]\right)\right)\right)+x\left(15c^2+20cdx^2+8d^2x^4\right)\text{ArcCos}[a\,x]\right)$$

Test results for the 118 problems in "5.2.5 Inverse cosine functions.m"

Problem 9: Result more than twice size of optimal antiderivative.

$$\int\frac{\left(d-c^2dx^2\right)^{3/2}\left(a+b\,\text{ArcCos}[c\,x]\right)}{f+g\,x}\,dx$$

Optimal (type 4, 1064 leaves, 29 steps) :

$$-\frac{a d (c f-g) (c f+g) \sqrt{d-c^2 d x^2}}{g^3}+\frac{b c d x \sqrt{d-c^2 d x^2}}{3 g \sqrt{1-c^2 x^2}}-\frac{b c d (c f-g) (c f+g) x \sqrt{d-c^2 d x^2}}{g^3 \sqrt{1-c^2 x^2}}+\frac{b c^3 d f x^2 \sqrt{d-c^2 d x^2}}{4 g^2 \sqrt{1-c^2 x^2}}-\frac{b c^3 d x^3 \sqrt{d-c^2 d x^2}}{9 g \sqrt{1-c^2 x^2}}-$$

$$\frac{b d (c f-g) (c f+g) \sqrt{d-c^2 d x^2} \text{ArcCos}[c x]}{g^3}+\frac{c^2 d f x \sqrt{d-c^2 d x^2} (a+b \text{ArcCos}[c x])}{2 g^2}+\frac{d (1-c^2 x^2) \sqrt{d-c^2 d x^2} (a+b \text{ArcCos}[c x])}{3 g}-$$

$$\frac{c d f \sqrt{d-c^2 d x^2} (a+b \text{ArcCos}[c x])^2}{4 b g^2 \sqrt{1-c^2 x^2}}+\frac{c d (c f-g) (c f+g) x \sqrt{d-c^2 d x^2} (a+b \text{ArcCos}[c x])^2}{2 b g^3 \sqrt{1-c^2 x^2}}+\frac{d (c^2 f^2-g^2)^2 \sqrt{d-c^2 d x^2} (a+b \text{ArcCos}[c x])^2}{2 b c g^4 (f+g x) \sqrt{1-c^2 x^2}}+$$

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

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

$$\frac{b d (c^2 f^2-g^2)^{3/2} \sqrt{d-c^2 d x^2} \text{PolyLog}\left[2,-\frac{e^{i \text{ArcCos}[c x]} g}{c f-\sqrt{c^2 f^2-g^2}}\right]}{g^4 \sqrt{1-c^2 x^2}}-\frac{b d (c^2 f^2-g^2)^{3/2} \sqrt{d-c^2 d x^2} \text{PolyLog}\left[2,-\frac{e^{i \text{ArcCos}[c x]} g}{c f+\sqrt{c^2 f^2-g^2}}\right]}{g^4 \sqrt{1-c^2 x^2}}$$

Result (type 4, 3034 leaves) :

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

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

$$\frac{1}{2 g^2} b d \sqrt{d (1-c^2 x^2)} \left(-\frac{2 c g x}{\sqrt{1-c^2 x^2}}-2 g \text{ArcCos}[c x]+\frac{c f \text{ArcCos}[c x]^2}{\sqrt{1-c^2 x^2}}+\right.$$

$$\frac{1}{\sqrt{-c^2 f^2+g^2} \sqrt{1-c^2 x^2}} 2 (-c f+g) (c f+g) \left(2 \text{ArcCos}[c x] \text{ArcTanh}\left[\frac{(c f+g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\right.$$

$$2 \text{ArcCos}\left[-\frac{c f}{g}\right] \text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+\left(\text{ArcCos}\left[-\frac{c f}{g}\right]-2 i \text{ArcTanh}\left[\frac{(c f+g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+\right.$$

$$2\,i\,\text{ArcTanh}\left[\frac{(-c f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\Bigg)\,\text{Log}\left[\frac{e^{-\frac{1}{2} i\,\text{ArcCos}[c x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c f+c g x}}\right]+\Bigg(\text{ArcCos}\left[-\frac{c f}{g}\right]+$$

$$2\,i\left(\text{ArcTanh}\left[\frac{(c f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\text{ArcTanh}\left[\frac{(-c f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\Bigg)\,\text{Log}\left[\frac{e^{\frac{1}{2} i\,\text{ArcCos}[c x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c f+c g x}}\right]-$$

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

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

$$i\left(\text{PolyLog}\left[2,\frac{\left(c f-i\sqrt{-c^2 f^2+g^2}\right)\left(c f+g-\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]-\right.$$

$$\left.\text{PolyLog}\left[2,\frac{\left(c f+i\sqrt{-c^2 f^2+g^2}\right)\left(c f+g-\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]\right)\Bigg)\Bigg)\Bigg)+$$

$$\frac{1}{72\sqrt{1-c^2 x^2}}\,b\,d\,\sqrt{d\left(1-c^2 x^2\right)}\left(\frac{1}{\sqrt{-c^2 f^2+g^2}}\,9\left(2\,\text{ArcCos}[c x]\,\text{ArcTanh}\left[\frac{(c f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\right.\right.$$

$$2\,\text{ArcCos}\left[-\frac{c f}{g}\right]\,\text{ArcTanh}\left[\frac{(-c f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+\left(\text{ArcCos}\left[-\frac{c f}{g}\right]-2\,i\,\text{ArcTanh}\left[\frac{(c f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+\right.$$

$$2\,i\,\text{ArcTanh}\left[\frac{(-c f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\Bigg)\,\text{Log}\left[\frac{e^{-\frac{1}{2} i\,\text{ArcCos}[c x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c f+c g x}}\right]+\Bigg(\text{ArcCos}\left[-\frac{c f}{g}\right]+$$

$$2\,i\left(\text{ArcTanh}\left[\frac{(c f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\text{ArcTanh}\left[\frac{(-c f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\Bigg)\,\text{Log}\left[\frac{e^{\frac{1}{2} i\,\text{ArcCos}[c x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c f+c g x}}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{c f}{g}\right]-2 i \text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right) \text{Log}\left[\frac{(c f+g) \left(-i c f+i g+\sqrt{-c^2 f^2+g^2}\right) \left(-i+\text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f+g+\sqrt{-c^2 f^2+g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{c f}{g}\right]+2 i \text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right) \text{Log}\left[\frac{(c f+g) \left(i c f-i g+\sqrt{-c^2 f^2+g^2}\right) \left(i+\text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f+g+\sqrt{-c^2 f^2+g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right]+$$

$$i \left(\text{PolyLog}\left[2, \frac{\left(c f-i \sqrt{-c^2 f^2+g^2}\right) \left(c f+g-\sqrt{-c^2 f^2+g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f+g+\sqrt{-c^2 f^2+g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right]-\right.$$

$$\left.\left.\text{PolyLog}\left[2, \frac{\left(c f+i \sqrt{-c^2 f^2+g^2}\right) \left(c f+g-\sqrt{-c^2 f^2+g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f+g+\sqrt{-c^2 f^2+g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right]\right)\right)+$$

$$\frac{1}{g^4}\left(18 c g \left(-4 c^2 f^2+g^2\right) x+18 g \left(-4 c^2 f^2+g^2\right) \sqrt{1-c^2 x^2} \text{ArcCos}[c x]+18 c f \left(2 c^2 f^2-g^2\right) \text{ArcCos}[c x]^2+\right.$$

$$9 c f g^2 \text{Cos}[2 \text{ArcCos}[c x]]-2 g^3 \text{Cos}[3 \text{ArcCos}[c x]]-\frac{1}{\sqrt{-c^2 f^2+g^2}} 9 \left(8 c^4 f^4-8 c^2 f^2 g^2+g^4\right)$$

$$\left(2 \text{ArcCos}[c x] \text{ArcTanh}\left[\frac{(c f+g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-2 \text{ArcCos}\left[-\frac{c f}{g}\right] \text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+\left(\text{ArcCos}\left[-\frac{c f}{g}\right]-2\right.\right.$$

$$\left.i \text{ArcTanh}\left[\frac{(c f+g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+2 i \text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right) \text{Log}\left[\frac{e^{-\frac{1}{2} i \text{ArcCos}[c x]} \sqrt{-c^2 f^2+g^2}}{\sqrt{2} \sqrt{g} \sqrt{c f+c g x}}\right]+$$

$$\left(\text{ArcCos}\left[-\frac{c f}{g}\right]+2 i \left(\text{ArcTanh}\left[\frac{(c f+g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\right)$$

$$\text{Log}\left[\frac{e^{\frac{1}{2} i \text{ArcCos}[c x]} \sqrt{-c^2 f^2+g^2}}{\sqrt{2} \sqrt{g} \sqrt{c f+c g x}}\right]-\left(\text{ArcCos}\left[-\frac{c f}{g}\right]-2 i \text{ArcTanh}\left[\frac{(-c f+g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)$$

$$\text{Log}\left[\frac{(c f+g)\left(-i c f+i g+\sqrt{-c^2 f^2+g^2}\right)\left(-i+\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]-$$

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

$$i\left(\text{PolyLog}\left[2,\frac{\left(c f-i\sqrt{-c^2 f^2+g^2}\right)\left(c f+g-\sqrt{-c^2 f^2+g^2}\ \text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]-\text{PolyLog}\left[\right.\right.$$

$$\left.\left.2,\frac{\left(c f+i\sqrt{-c^2 f^2+g^2}\right)\left(c f+g-\sqrt{-c^2 f^2+g^2}\ \text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]\right)\Bigg)+$$

$$\left.\left.18 c f g^2\,\text{ArcCos}[c x]\,\text{Sin}[2\,\text{ArcCos}[c x]]-6 g^3\,\text{ArcCos}[c x]\,\text{Sin}[3\,\text{ArcCos}[c x]]\right)\right)$$

Problem 13: Result more than twice size of optimal antiderivative.

$$\int\frac{\left(d-c^2 d x^2\right)^{5/2}(a+b\,\text{ArcCos}[c x])}{f+g x}\,dx$$

Optimal (type 4, 1637 leaves, 37 steps):

$$\frac{a d^2 \left(c^2 f^2-g^2\right)^2 \sqrt{d-c^2 d x^2}}{g^5}-\frac{2 b c d^2 x \sqrt{d-c^2 d x^2}}{15 g \sqrt{1-c^2 x^2}}-\frac{b c d^2 \left(c^2 f^2-2 g^2\right) x \sqrt{d-c^2 d x^2}}{3 g^3 \sqrt{1-c^2 x^2}}+\frac{b c d^2 \left(c^2 f^2-g^2\right)^2 x \sqrt{d-c^2 d x^2}}{g^5 \sqrt{1-c^2 x^2}}+$$

$$\frac{b c^3 d^2 f x^2 \sqrt{d-c^2 d x^2}}{16 g^2 \sqrt{1-c^2 x^2}}-\frac{b c^3 d^2 f \left(c^2 f^2-2 g^2\right) x^2 \sqrt{d-c^2 d x^2}}{4 g^4 \sqrt{1-c^2 x^2}}-\frac{b c^3 d^2 x^3 \sqrt{d-c^2 d x^2}}{45 g \sqrt{1-c^2 x^2}}+\frac{b c^3 d^2 \left(c^2 f^2-2 g^2\right) x^3 \sqrt{d-c^2 d x^2}}{9 g^3 \sqrt{1-c^2 x^2}}-$$

$$\frac{b c^5 d^2 f x^4 \sqrt{d-c^2 d x^2}}{16 g^2 \sqrt{1-c^2 x^2}}+\frac{b c^5 d^2 x^5 \sqrt{d-c^2 d x^2}}{25 g \sqrt{1-c^2 x^2}}+\frac{b d^2 \left(c^2 f^2-g^2\right)^2 \sqrt{d-c^2 d x^2}\ \text{ArcCos}[c x]}{g^5}+\frac{c^2 d^2 f x \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])}{8 g^2}-$$

$$\frac{c^2 d^2 f \left(c^2 f^2-2 g^2\right) x \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])}{2 g^4}-\frac{c^4 d^2 f x^3 \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])}{4 g^2}-$$

$$\frac{d^2 \left(1-c^2 x^2\right) \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])}{3 g}-\frac{d^2 \left(c^2 f^2-2 g^2\right) \left(1-c^2 x^2\right) \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])}{3 g^3}+$$

$$\frac{d^2 \left(1-c^2 x^2\right)^2 \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])}{5 g}+\frac{c d^2 f \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])^2}{16 b g^2 \sqrt{1-c^2 x^2}}+\frac{c d^2 f \left(c^2 f^2-2 g^2\right) \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])^2}{4 b g^4 \sqrt{1-c^2 x^2}}-$$

$$\frac{c d^2 \left(c^2 f^2-g^2\right)^2 x \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])^2}{2 b g^5 \sqrt{1-c^2 x^2}}-\frac{d^2 \left(c^2 f^2-g^2\right)^3 \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])^2}{2 b c g^6 (f+g x) \sqrt{1-c^2 x^2}}-$$

$$\frac{d^2 \left(c^2 f^2-g^2\right)^2 \sqrt{1-c^2 x^2} \sqrt{d-c^2 d x^2}\ (a+b\,\text{ArcCos}[c x])^2}{2 b c g^4 (f+g x)}-\frac{a d^2 \left(c^2 f^2-g^2\right)^{5/2} \sqrt{d-c^2 d x^2}\ \text{ArcTan}\left[\frac{g+c^2 f x}{\sqrt{c^2 f^2-g^2} \sqrt{1-c^2 x^2}}\right]}{g^6 \sqrt{1-c^2 x^2}}-$$

$$\frac{i b d^2 \left(c^2 f^2-g^2\right)^{5/2} \sqrt{d-c^2 d x^2}\ \text{ArcCos}[c x]\ \text{Log}\left[1+\frac{e^{i\,\text{ArcCos}[c x]} g}{c f-\sqrt{c^2 f^2-g^2}}\right]}{g^6 \sqrt{1-c^2 x^2}}+\frac{i b d^2 \left(c^2 f^2-g^2\right)^{5/2} \sqrt{d-c^2 d x^2}\ \text{ArcCos}[c x]\ \text{Log}\left[1+\frac{e^{i\,\text{ArcCos}[c x]} g}{c f+\sqrt{c^2 f^2-g^2}}\right]}{g^6 \sqrt{1-c^2 x^2}}-$$

$$\frac{b d^2 \left(c^2 f^2-g^2\right)^{5/2} \sqrt{d-c^2 d x^2}\ \text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c x]} g}{c f-\sqrt{c^2 f^2-g^2}}\right]}{g^6 \sqrt{1-c^2 x^2}}+\frac{b d^2 \left(c^2 f^2-g^2\right)^{5/2} \sqrt{d-c^2 d x^2}\ \text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c x]} g}{c f+\sqrt{c^2 f^2-g^2}}\right]}{g^6 \sqrt{1-c^2 x^2}}$$

Result (type 4, 7206 leaves):

$$\sqrt{-d \left(-1+c^2 x^2\right)} \left(\frac{a d^2 \left(15 c^4 f^4-35 c^2 f^2 g^2+23 g^4\right)}{15 g^5}-\frac{a c^2 d^2 f \left(4 c^2 f^2-9 g^2\right) x}{8 g^4}-\frac{a c^2 d^2 \left(-5 c^2 f^2+11 g^2\right) x^2}{15 g^3}-\frac{a c^4 d^2 f x^3}{4 g^2}+\frac{a c^4 d^2 x^4}{5 g}\right)-$$

$$\frac{a c d^{5/2} f \left(8 c^4 f^4-20 c^2 f^2 g^2+15 g^4\right) \text{ArcTan}\left[\frac{c x \sqrt{-d \left(-1+c^2 x^2\right)}}{\sqrt{d} \left(-1+c^2 x^2\right)}\right]}{8 g^6}+\frac{a d^{5/2} \left(-c^2 f^2+g^2\right)^{5/2} \text{Log}[f+g x]}{g^6}-$$

$$\frac{a d^{5/2} \left(-c^2 f^2+g^2\right)^{5/2} \text{Log}\left[d g+c^2 d f x+\sqrt{d} \sqrt{-c^2 f^2+g^2} \sqrt{-d \left(-1+c^2 x^2\right)}\right]}{g^6}-$$

$$\frac{1}{2 g^2} b d^2 \sqrt{d \left(1 - c^2 x^2\right)} \left(-\frac{2 c g x}{\sqrt{1 - c^2 x^2}} - 2 g \text{ArcCos}[c x] + \frac{c f \text{ArcCos}[c x]^2}{\sqrt{1 - c^2 x^2}} + \right.$$

$$\frac{1}{\sqrt{-c^2 f^2 + g^2} \sqrt{1 - c^2 x^2}} 2 (-c f + g) (c f + g) \left(2 \text{ArcCos}[c x] \text{ArcTanh}\left[\frac{(c f + g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right] - \right.$$

$$2 \text{ArcCos}\left[-\frac{c f}{g}\right] \text{ArcTanh}\left[\frac{(-c f + g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right] + \left(\text{ArcCos}\left[-\frac{c f}{g}\right] - 2 i \text{ArcTanh}\left[\frac{(c f + g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right] + \right.$$

$$\left. 2 i \text{ArcTanh}\left[\frac{(-c f + g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right]\right) \text{Log}\left[\frac{e^{-\frac{1}{2} i \text{ArcCos}[c x]} \sqrt{-c^2 f^2 + g^2}}{\sqrt{2} \sqrt{g} \sqrt{c f + c g x}}\right] + \left(\text{ArcCos}\left[-\frac{c f}{g}\right] + \right.$$

$$\left. 2 i \left(\text{ArcTanh}\left[\frac{(c f + g) \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right] - \text{ArcTanh}\left[\frac{(-c f + g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right]\right)\right) \text{Log}\left[\frac{e^{\frac{1}{2} i \text{ArcCos}[c x]} \sqrt{-c^2 f^2 + g^2}}{\sqrt{2} \sqrt{g} \sqrt{c f + c g x}}\right] -$$

$$\left(\text{ArcCos}\left[-\frac{c f}{g}\right] - 2 i \text{ArcTanh}\left[\frac{(-c f + g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right]\right) \text{Log}\left[\frac{(c f + g) \left(-i c f + i g + \sqrt{-c^2 f^2 + g^2}\right) \left(-i + \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f + g + \sqrt{-c^2 f^2 + g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right] -$$

$$\left(\text{ArcCos}\left[-\frac{c f}{g}\right] + 2 i \text{ArcTanh}\left[\frac{(-c f + g) \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]}{\sqrt{-c^2 f^2 + g^2}}\right]\right) \text{Log}\left[\frac{(c f + g) \left(i c f - i g + \sqrt{-c^2 f^2 + g^2}\right) \left(i + \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f + g + \sqrt{-c^2 f^2 + g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right] +$$

$$i \left(\text{PolyLog}\left[2, \frac{\left(c f - i \sqrt{-c^2 f^2 + g^2}\right) \left(c f + g - \sqrt{-c^2 f^2 + g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f + g + \sqrt{-c^2 f^2 + g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right] - \right.$$

$$\left.\left.\left.\text{PolyLog}\left[2, \frac{\left(c f + i \sqrt{-c^2 f^2 + g^2}\right) \left(c f + g - \sqrt{-c^2 f^2 + g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}{g \left(c f + g + \sqrt{-c^2 f^2 + g^2} \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c x]\right]\right)}\right]\right)\right)\right) +$$

$$\frac{1}{36\sqrt{1-c^2x^2}} b d^2 \sqrt{d\left(1-c^2x^2\right)} \left(\frac{1}{\sqrt{-c^2f^2+g^2}} 9 \left(2\,\text{ArcCos}[c\,x]\,\text{ArcTanh}\left[\frac{(c\,f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] - \right.\right.$$

$$2\,\text{ArcCos}\left[-\frac{c\,f}{g}\right]\text{ArcTanh}\left[\frac{(-c\,f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] + \left(\text{ArcCos}\left[-\frac{c\,f}{g}\right] - 2\,i\,\text{ArcTanh}\left[\frac{(c\,f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] + \right.$$

$$\left.2\,i\,\text{ArcTanh}\left[\frac{(-c\,f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\text{Log}\left[\frac{e^{-\frac{1}{2}i\,\text{ArcCos}[c\,x]}\sqrt{-c^2f^2+g^2}}{\sqrt{2}\sqrt{g}\sqrt{c\,f+c\,g\,x}}\right] + \left(\text{ArcCos}\left[-\frac{c\,f}{g}\right] + \right.$$

$$\left.2\,i\left(\text{ArcTanh}\left[\frac{(c\,f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] - \text{ArcTanh}\left[\frac{(-c\,f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\right)\text{Log}\left[\frac{e^{\frac{1}{2}i\,\text{ArcCos}[c\,x]}\sqrt{-c^2f^2+g^2}}{\sqrt{2}\sqrt{g}\sqrt{c\,f+c\,g\,x}}\right] -$$

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

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

$$i\left(\text{PolyLog}\left[2, \frac{\left(c\,f-i\sqrt{-c^2f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}\right] - \right.$$

$$\left.\left.\text{PolyLog}\left[2, \frac{\left(c\,f+i\sqrt{-c^2f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}\right]\right)\right) +$$

$$\frac{1}{g^4}\left(18\,c\,g\left(-4\,c^2f^2+g^2\right)x + 18\,g\left(-4\,c^2f^2+g^2\right)\sqrt{1-c^2x^2}\,\text{ArcCos}[c\,x] + 18\,c\,f\left(2\,c^2f^2-g^2\right)\text{ArcCos}[c\,x]^2 + \right.$$

$$9\,c\,f\,g^2\,\text{Cos}[2\,\text{ArcCos}[c\,x]] - 2\,g^3\,\text{Cos}[3\,\text{ArcCos}[c\,x]] - \frac{1}{\sqrt{-c^2f^2+g^2}} 9\left(8\,c^4f^4 - 8\,c^2f^2g^2 + g^4\right)$$

$$\Bigg(2\,\mathrm{ArcCos}[c\,x]\,\mathrm{ArcTanh}\Big[\frac{(c\,f+g)\,\mathrm{Cot}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]-2\,\mathrm{ArcCos}\Big[-\frac{c\,f}{g}\Big]\,\mathrm{ArcTanh}\Big[\frac{(-c\,f+g)\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]+\Bigg(\mathrm{ArcCos}\Big[-\frac{c\,f}{g}\Big]-2$$

$$i\,\mathrm{ArcTanh}\Big[\frac{(c\,f+g)\,\mathrm{Cot}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]+2\,i\,\mathrm{ArcTanh}\Big[\frac{(-c\,f+g)\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)\,\mathrm{Log}\Big[\frac{e^{-\frac{1}{2}i\,\mathrm{ArcCos}[c\,x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c\,f+c\,g\,x}}\Big]+$$

$$\Bigg(\mathrm{ArcCos}\Big[-\frac{c\,f}{g}\Big]+2\,i\,\Bigg(\mathrm{ArcTanh}\Big[\frac{(c\,f+g)\,\mathrm{Cot}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]-\mathrm{ArcTanh}\Big[\frac{(-c\,f+g)\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)\Bigg)$$

$$\mathrm{Log}\Big[\frac{e^{\frac{1}{2}i\,\mathrm{ArcCos}[c\,x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c\,f+c\,g\,x}}\Big]-\Bigg(\mathrm{ArcCos}\Big[-\frac{c\,f}{g}\Big]-2\,i\,\mathrm{ArcTanh}\Big[\frac{(-c\,f+g)\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)$$

$$\mathrm{Log}\Big[\frac{(c\,f+g)\,\big(-i\,c\,f+i\,g+\sqrt{-c^2 f^2+g^2}\big)\,\big(-i+\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}{g\,\big(c\,f+g+\sqrt{-c^2 f^2+g^2}\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}\Big]-$$

$$\Bigg(\mathrm{ArcCos}\Big[-\frac{c\,f}{g}\Big]+2\,i\,\mathrm{ArcTanh}\Big[\frac{(-c\,f+g)\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)\,\mathrm{Log}\Big[\frac{(c\,f+g)\,\big(i\,c\,f-i\,g+\sqrt{-c^2 f^2+g^2}\big)\,\big(i+\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}{g\,\big(c\,f+g+\sqrt{-c^2 f^2+g^2}\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}\Big]+$$

$$i\,\Bigg(\mathrm{PolyLog}\Big[2,\ \frac{\big(c\,f-i\,\sqrt{-c^2 f^2+g^2}\big)\,\big(c\,f+g-\sqrt{-c^2 f^2+g^2}\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}{g\,\big(c\,f+g+\sqrt{-c^2 f^2+g^2}\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}\Big]-\mathrm{PolyLog}\Big[$$

$$2,\ \frac{\big(c\,f+i\,\sqrt{-c^2 f^2+g^2}\big)\,\big(c\,f+g-\sqrt{-c^2 f^2+g^2}\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}{g\,\big(c\,f+g+\sqrt{-c^2 f^2+g^2}\,\mathrm{Tan}\big[\frac{1}{2}\mathrm{ArcCos}[c\,x]\big]\big)}\Big]\Bigg)\Bigg)+$$

$$18\,c\,f\,g^2\,\mathrm{ArcCos}[c\,x]\,\mathrm{Sin}[2\,\mathrm{ArcCos}[c\,x]]-6\,g^3\,\mathrm{ArcCos}[c\,x]\,\mathrm{Sin}[3\,\mathrm{ArcCos}[c\,x]]\Bigg)\Bigg)-$$

$$
b\,d^2\left(\frac{1}{32\,g^2\sqrt{1-c^2x^2}}\sqrt{d\left(1-c^2x^2\right)}\left(2\,c\,g\,x+2\,g\sqrt{1-c^2x^2}\,\mathrm{ArcCos}[c\,x]-c\,f\,\mathrm{ArcCos}[c\,x]^2-\frac{1}{\sqrt{-c^2f^2+g^2}}\left(-2\,c^2f^2+g^2\right)\right.\right.
$$

$$
\left(2\,\mathrm{ArcCos}[c\,x]\,\mathrm{ArcTanh}\left[\frac{(c\,f+g)\,\mathrm{Cot}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]-2\,\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right]\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]+\left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right]-2\right.\right.
$$

$$
\left.i\,\mathrm{ArcTanh}\left[\frac{(c\,f+g)\,\mathrm{Cot}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]+2\,i\,\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\mathrm{Log}\left[\frac{e^{-\frac{1}{2}i\,\mathrm{ArcCos}[c\,x]}\sqrt{-c^2f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c\,f+c\,g\,x}}\right]+
$$

$$
\left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right]+2\,i\left(\mathrm{ArcTanh}\left[\frac{(c\,f+g)\,\mathrm{Cot}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]-\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\right)
$$

$$
\mathrm{Log}\left[\frac{e^{\frac{1}{2}i\,\mathrm{ArcCos}[c\,x]}\sqrt{-c^2f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c\,f+c\,g\,x}}\right]-\left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right]-2\,i\,\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)
$$

$$
\mathrm{Log}\left[\frac{(c\,f+g)\left(-i\,c\,f+i\,g+\sqrt{-c^2f^2+g^2}\right)\left(-i+\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}\right]-
$$

$$
\left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right]+2\,i\,\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\mathrm{Log}\left[\frac{(c\,f+g)\left(i\,c\,f-i\,g+\sqrt{-c^2f^2+g^2}\right)\left(i+\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}\right]+
$$

$$
i\left(\mathrm{PolyLog}\left[2,\frac{\left(c\,f-i\sqrt{-c^2f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}\right]-\mathrm{PolyLog}\left[\right.\right.
$$

$$
\left.\left.\left.\left.2,\frac{\left(c\,f+i\sqrt{-c^2f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}\right]\right)\right)\right)+
$$

$$\frac{1}{16\sqrt{-c^2 f^2+g^2}\ \sqrt{1-c^2 x^2}}\sqrt{d\left(1-c^2 x^2\right)}\ \Bigg(2\,\text{ArcCos}[c\,x]\ \text{ArcTanh}\Big[\frac{(c\,f+g)\ \text{Cot}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]-$$

$$2\,\text{ArcCos}\Big[-\frac{c\,f}{g}\Big]\ \text{ArcTanh}\Big[\frac{(-c\,f+g)\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]+$$

$$\Bigg(\text{ArcCos}\Big[-\frac{c\,f}{g}\Big]-2\,i\,\text{ArcTanh}\Big[\frac{(c\,f+g)\ \text{Cot}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]+2\,i\,\text{ArcTanh}\Big[\frac{(-c\,f+g)\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)$$

$$\text{Log}\Big[\frac{e^{-\frac{1}{2}i\,\text{ArcCos}[c\,x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\ \sqrt{g}\ \sqrt{c\,f+c\,g\,x}}\Big]+$$

$$\Bigg(\text{ArcCos}\Big[-\frac{c\,f}{g}\Big]+2\,i\,\Bigg(\text{ArcTanh}\Big[\frac{(c\,f+g)\ \text{Cot}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]-\text{ArcTanh}\Big[\frac{(-c\,f+g)\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)\Bigg)$$

$$\text{Log}\Big[\frac{e^{\frac{1}{2}i\,\text{ArcCos}[c\,x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\ \sqrt{g}\ \sqrt{c\,f+c\,g\,x}}\Big]-\Bigg(\text{ArcCos}\Big[-\frac{c\,f}{g}\Big]-2\,i\,\text{ArcTanh}\Big[\frac{(-c\,f+g)\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)$$

$$\text{Log}\Bigg[\frac{(c\,f+g)\left(-i\,c\,f+i\,g+\sqrt{-c^2 f^2+g^2}\right)\left(-i+\text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}{g\left(c\,f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}\Bigg]-$$

$$\Bigg(\text{ArcCos}\Big[-\frac{c\,f}{g}\Big]+2\,i\,\text{ArcTanh}\Big[\frac{(-c\,f+g)\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{-c^2 f^2+g^2}}\Big]\Bigg)\ \text{Log}\Bigg[\frac{(c\,f+g)\left(i\,c\,f-i\,g+\sqrt{-c^2 f^2+g^2}\right)\left(i+\text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}{g\left(c\,f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}\Bigg]+$$

$$i\,\Bigg(\text{PolyLog}\Bigg[2,\frac{\left(c\,f-i\sqrt{-c^2 f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2 f^2+g^2}\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}{g\left(c\,f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}\Bigg]-$$

$$\text{PolyLog}\Bigg[2,\frac{\left(c\,f+i\sqrt{-c^2 f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2 f^2+g^2}\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}{g\left(c\,f+g+\sqrt{-c^2 f^2+g^2}\ \text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]\right)}\Bigg]\Bigg)\Bigg)+$$

$$\frac{1}{144\, g^4 \sqrt{1-c^2 x^2}} \sqrt{d\,\left(1-c^2 x^2\right)} \left(18\, c\, g\, \left(-4\, c^2 f^2+g^2\right) x + 18\, g\, \left(-4\, c^2 f^2+g^2\right) \sqrt{1-c^2 x^2}\, \text{ArcCos}[c\, x] + 18\, c\, f\, \left(2\, c^2 f^2-g^2\right) \text{ArcCos}[c\, x]^2 + \right.$$

$$9\, c\, f\, g^2 \text{Cos}[2\, \text{ArcCos}[c\, x]] - 2\, g^3 \text{Cos}[3\, \text{ArcCos}[c\, x]] - \frac{1}{\sqrt{-c^2 f^2+g^2}} 9\, \left(8\, c^4 f^4 - 8\, c^2 f^2 g^2 + g^4\right)$$

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

$$\left. i\, \text{ArcTanh}\left[\frac{(c\, f+g)\, \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right] + 2\, i\, \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right) \text{Log}\left[\frac{e^{-\frac{1}{2} i\, \text{ArcCos}[c\, x]} \sqrt{-c^2 f^2+g^2}}{\sqrt{2}\, \sqrt{g}\, \sqrt{c\, f+c\, g\, x}}\right] +$$

$$\left(\text{ArcCos}\left[-\frac{c\, f}{g}\right] + 2\, i\, \left(\text{ArcTanh}\left[\frac{(c\, f+g)\, \text{Cot}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right] - \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\right)$$

$$\text{Log}\left[\frac{e^{\frac{1}{2} i\, \text{ArcCos}[c\, x]} \sqrt{-c^2 f^2+g^2}}{\sqrt{2}\, \sqrt{g}\, \sqrt{c\, f+c\, g\, x}}\right] - \left(\text{ArcCos}\left[-\frac{c\, f}{g}\right] - 2\, i\, \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)$$

$$\text{Log}\left[\frac{(c\, f+g)\, \left(-i\, c\, f + i\, g + \sqrt{-c^2 f^2+g^2}\right) \left(-i + \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]\right)}\right] -$$

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

$$i\, \left(\text{PolyLog}\left[2, \frac{\left(c\, f - i\, \sqrt{-c^2 f^2+g^2}\right) \left(c\, f+g-\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]\right)}\right] - \text{PolyLog}\left[\right.\right.$$

$$\left.\left.\left. 2, \frac{\left(c\, f + i\, \sqrt{-c^2 f^2+g^2}\right) \left(c\, f+g-\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2} \text{ArcCos}[c\, x]\right]\right)}\right]\right)\right) +$$

$$18\,c\,f\,g^2\,\mathrm{ArcCos}[c\,x]\,\mathrm{Sin}[2\,\mathrm{ArcCos}[c\,x]] - 6\,g^3\,\mathrm{ArcCos}[c\,x]\,\mathrm{Sin}[3\,\mathrm{ArcCos}[c\,x]]\Bigg) + \frac{1}{32\sqrt{1-c^2x^2}}$$

$$\sqrt{d\left(1-c^2x^2\right)}\left(-\frac{2\,c\left(16\,c^4f^4-12\,c^2f^2g^2+g^4\right)x}{g^5} - \frac{32\,c^4f^4\sqrt{1-c^2x^2}\,\mathrm{ArcCos}[c\,x]}{g^5} + \frac{24\,c^2f^2\sqrt{1-c^2x^2}\,\mathrm{ArcCos}[c\,x]}{g^3} - \right.$$

$$\frac{2\sqrt{1-c^2x^2}\,\mathrm{ArcCos}[c\,x]}{g} + \frac{16\,c^5f^5\,\mathrm{ArcCos}[c\,x]^2}{g^6} - \frac{16\,c^3f^3\,\mathrm{ArcCos}[c\,x]^2}{g^4} + \frac{3\,c\,f\,\mathrm{ArcCos}[c\,x]^2}{g^2} -$$

$$\frac{2\,c\,f\left(-2\,c^2f^2+g^2\right)\mathrm{Cos}[2\,\mathrm{ArcCos}[c\,x]]}{g^4} - \frac{8\,c^2f^2\,\mathrm{Cos}[3\,\mathrm{ArcCos}[c\,x]]}{9\,g^3} + \frac{2\,\mathrm{Cos}[3\,\mathrm{ArcCos}[c\,x]]}{9\,g} +$$

$$\frac{c\,f\,\mathrm{Cos}[4\,\mathrm{ArcCos}[c\,x]]}{4\,g^2} - \frac{2\,\mathrm{Cos}[5\,\mathrm{ArcCos}[c\,x]]}{25\,g} + \frac{1}{g^6\sqrt{-c^2f^2+g^2}}\left(-2\,c^2f^2+g^2\right)\left(16\,c^4f^4-16\,c^2f^2g^2+g^4\right)$$

$$\left(2\,\mathrm{ArcCos}[c\,x]\,\mathrm{ArcTanh}\left[\frac{(c\,f+g)\,\mathrm{Cot}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] - 2\,\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right]\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] + \left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right] - 2\right.\right.$$

$$\left.i\,\mathrm{ArcTanh}\left[\frac{(c\,f+g)\,\mathrm{Cot}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] + 2\,i\,\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\mathrm{Log}\left[\frac{e^{-\frac{1}{2}i\,\mathrm{ArcCos}[c\,x]}\sqrt{-c^2f^2+g^2}}{\sqrt{2}\sqrt{g}\sqrt{c\,f+c\,g\,x}}\right] +$$

$$\left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right] + 2\,i\left(\mathrm{ArcTanh}\left[\frac{(c\,f+g)\,\mathrm{Cot}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right] - \mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\right)$$

$$\mathrm{Log}\left[\frac{e^{\frac{1}{2}i\,\mathrm{ArcCos}[c\,x]}\sqrt{-c^2f^2+g^2}}{\sqrt{2}\sqrt{g}\sqrt{c\,f+c\,g\,x}}\right] - \left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right] - 2\,i\,\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)$$

$$\mathrm{Log}\left[\frac{(c\,f+g)\left(-i\,c\,f+i\,g+\sqrt{-c^2f^2+g^2}\right)\left(-i+\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}\right] -$$

$$\left(\mathrm{ArcCos}\left[-\frac{c\,f}{g}\right] + 2\,i\,\mathrm{ArcTanh}\left[\frac{(-c\,f+g)\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]}{\sqrt{-c^2f^2+g^2}}\right]\right)\mathrm{Log}\left[\frac{(c\,f+g)\left(i\,c\,f-i\,g+\sqrt{-c^2f^2+g^2}\right)\left(i+\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2f^2+g^2}\,\mathrm{Tan}\left[\frac{1}{2}\mathrm{ArcCos}[c\,x]\right]\right)}\right] +$$

$$i\left(\text{PolyLog}\left[2,\frac{\left(c f-i\sqrt{-c^2 f^2+g^2}\right)\left(c f+g-\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]-\text{PolyLog}\left[2,\frac{\left(c f+i\sqrt{-c^2 f^2+g^2}\right)\left(c f+g-\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}{g\left(c f+g+\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c x]\right]\right)}\right]\right)\Bigg)+$$

$$\frac{8 c^3 f^3 \text{ArcCos}[c x]\,\text{Sin}[2\,\text{ArcCos}[c x]]}{g^4}-\frac{4 c f\,\text{ArcCos}[c x]\,\text{Sin}[2\,\text{ArcCos}[c x]]}{g^2}-\frac{8 c^2 f^2 \text{ArcCos}[c x]\,\text{Sin}[3\,\text{ArcCos}[c x]]}{3 g^3}+$$

$$\frac{2\,\text{ArcCos}[c x]\,\text{Sin}[3\,\text{ArcCos}[c x]]}{3 g}+\frac{c f\,\text{ArcCos}[c x]\,\text{Sin}[4\,\text{ArcCos}[c x]]}{g^2}-\frac{2\,\text{ArcCos}[c x]\,\text{Sin}[5\,\text{ArcCos}[c x]]}{5 g}\Bigg)\Bigg)$$

Problem 17: Result more than twice size of optimal antiderivative.

$$\int \frac{a+b\,\text{ArcCos}[c x]}{(f+g x)\sqrt{d-c^2 d x^2}}\,dx$$

Optimal (type 4, 370 leaves, 10 steps):

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

$$\frac{b\sqrt{1-c^2 x^2}\,\text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c x]}\,g}{c f-\sqrt{c^2 f^2-g^2}}\right]}{\sqrt{c^2 f^2-g^2}\,\sqrt{d-c^2 d x^2}}-\frac{b\sqrt{1-c^2 x^2}\,\text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c x]}\,g}{c f+\sqrt{c^2 f^2-g^2}}\right]}{\sqrt{c^2 f^2-g^2}\,\sqrt{d-c^2 d x^2}}$$

Result (type 4, 930 leaves):

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

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

$$\left(\text{ArcCos}\left[-\frac{c\,f}{g}\right]-2\,i\,\text{ArcTanh}\left[\frac{(c\,f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+2\,i\,\text{ArcTanh}\left[\frac{(-c\,f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)$$

$$\text{Log}\left[\frac{e^{-\frac{1}{2}i\,\text{ArcCos}[c\,x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c\,(f+g\,x)}}\right]+\left(\text{ArcCos}\left[-\frac{c\,f}{g}\right]+\right.$$

$$\left.2\,i\left(\text{ArcTanh}\left[\frac{(c\,f+g)\,\text{Cot}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\text{ArcTanh}\left[\frac{(-c\,f+g)\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\right)\text{Log}\left[\frac{e^{\frac{1}{2}i\,\text{ArcCos}[c\,x]}\sqrt{-c^2 f^2+g^2}}{\sqrt{2}\,\sqrt{g}\,\sqrt{c\,(f+g\,x)}}\right]-$$

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

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

$$i\left(\text{PolyLog}\left[2,\frac{\left(c\,f-i\,\sqrt{-c^2 f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}\right]-\right.$$

$$\left.\left.\left.\text{PolyLog}\left[2,\frac{\left(c\,f+i\,\sqrt{-c^2 f^2+g^2}\right)\left(c\,f+g-\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}{g\left(c\,f+g+\sqrt{-c^2 f^2+g^2}\,\text{Tan}\left[\frac{1}{2}\text{ArcCos}[c\,x]\right]\right)}\right]\right)\right)\right)$$

Problem 18: Result more than twice size of optimal antiderivative.

$$\int \frac{a + b \,\text{ArcCos}[c\, x]}{(f + g\, x)^2 \sqrt{d - c^2 d\, x^2}}\, dx$$

Optimal (type 4, 496 leaves, 13 steps):

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

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

$$\frac{b\,c^2 f\,\sqrt{1 - c^2 x^2}\,\text{PolyLog}\left[2, -\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f - \sqrt{c^2 f^2 - g^2}}\right]}{(c^2 f^2 - g^2)^{3/2}\,\sqrt{d - c^2 d\,x^2}} - \frac{b\,c^2 f\,\sqrt{1 - c^2 x^2}\,\text{PolyLog}\left[2, -\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f + \sqrt{c^2 f^2 - g^2}}\right]}{(c^2 f^2 - g^2)^{3/2}\,\sqrt{d - c^2 d\,x^2}}$$

Result (type 4, 1108 leaves):

$$-\frac{a\, g\, \sqrt{d-c^2 d\, x^2}}{d\, \left(-c^2 f^2+g^2\right)\, (f+g\, x)}-\frac{a\, c^2 f\, \text{Log}[f+g\, x]}{\sqrt{d}\, \left(-c^2 f^2+g^2\right)^{3/2}}-\frac{a\, c^2 f\, \text{Log}\left[d\, \left(g+c^2 f\, x\right)+\sqrt{d}\, \sqrt{-c^2 f^2+g^2}\, \sqrt{d-c^2 d\, x^2}\right]}{\sqrt{d}\, (c\, f-g)\, (c\, f+g)\, \sqrt{-c^2 f^2+g^2}}-$$

$$\frac{1}{\sqrt{d-c^2 d\, x^2}}\, b\, c\, \sqrt{1-c^2 x^2}\, \left(-\frac{g\, \sqrt{1-c^2 x^2}\, \text{ArcCos}[c\, x]}{(c\, f-g)\, (c\, f+g)\, (c\, f+c\, g\, x)}-\frac{\text{Log}\left[1+\frac{g\, x}{f}\right]}{c^2 f^2-g^2}-\right.$$

$$\frac{1}{\left(-c^2 f^2+g^2\right)^{3/2}}\, c\, f\, \left(2\, \text{ArcCos}[c\, x]\, \text{ArcTanh}\left[\frac{(c\, f+g)\, \text{Cot}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-2\, \text{ArcCos}\left[-\frac{c\, f}{g}\right]\, \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+\right.$$

$$\left(\text{ArcCos}\left[-\frac{c\, f}{g}\right]-2\, \mathrm{i}\, \text{ArcTanh}\left[\frac{(c\, f+g)\, \text{Cot}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]+2\, \mathrm{i}\, \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)$$

$$\text{Log}\left[\frac{e^{-\frac{1}{2}\, \mathrm{i}\, \text{ArcCos}[c\, x]}\, \sqrt{-c^2 f^2+g^2}}{\sqrt{2}\, \sqrt{g}\, \sqrt{c\, (f+g\, x)}}\right]+\left(\text{ArcCos}\left[-\frac{c\, f}{g}\right]+\right.$$

$$\left.2\, \mathrm{i}\, \left(\text{ArcTanh}\left[\frac{(c\, f+g)\, \text{Cot}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]-\text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\right)\, \text{Log}\left[\frac{e^{\frac{1}{2}\, \mathrm{i}\, \text{ArcCos}[c\, x]}\, \sqrt{-c^2 f^2+g^2}}{\sqrt{2}\, \sqrt{g}\, \sqrt{c\, (f+g\, x)}}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{c\, f}{g}\right]-2\, \mathrm{i}\, \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\, \text{Log}\left[\frac{(c\, f+g)\, \left(-\mathrm{i}\, c\, f+\mathrm{i}\, g+\sqrt{-c^2 f^2+g^2}\right)\, \left(-\mathrm{i}+\text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}\right]-$$

$$\left(\text{ArcCos}\left[-\frac{c\, f}{g}\right]+2\, \mathrm{i}\, \text{ArcTanh}\left[\frac{(-c\, f+g)\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]}{\sqrt{-c^2 f^2+g^2}}\right]\right)\, \text{Log}\left[\frac{(c\, f+g)\, \left(\mathrm{i}\, c\, f-\mathrm{i}\, g+\sqrt{-c^2 f^2+g^2}\right)\, \left(\mathrm{i}+\text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}\right]+$$

$$\mathrm{i}\, \left(\text{PolyLog}\left[2,\, \frac{\left(c\, f-\mathrm{i}\, \sqrt{-c^2 f^2+g^2}\right)\, \left(c\, f+g-\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}\right]-\right.$$

$$\left.\left.\left.\text{PolyLog}\left[2,\, \frac{\left(c\, f+\mathrm{i}\, \sqrt{-c^2 f^2+g^2}\right)\, \left(c\, f+g-\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}{g\, \left(c\, f+g+\sqrt{-c^2 f^2+g^2}\, \text{Tan}\left[\frac{1}{2}\, \text{ArcCos}[c\, x]\right]\right)}\right]\right)\right)\right)$$

Problem 20: Unable to integrate problem.

$$\int \frac{(a+b\,\text{ArcCos}[c\,x])^2\,\text{Log}\left[h\,(f+g\,x)^m\right]}{\sqrt{1-c^2\,x^2}}\,dx$$

Optimal (type 4, 496 leaves, 13 steps):

$$-\frac{i\,m\,(a+b\,\text{ArcCos}[c\,x])^4}{12\,b^2\,c}+\frac{m\,(a+b\,\text{ArcCos}[c\,x])^3\,\text{Log}\left[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{3\,b\,c}+\frac{m\,(a+b\,\text{ArcCos}[c\,x])^3\,\text{Log}\left[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{3\,b\,c}-\frac{(a+b\,\text{ArcCos}[c\,x])^3\,\text{Log}\left[h\,(f+g\,x)^m\right]}{3\,b\,c}-\frac{i\,m\,(a+b\,\text{ArcCos}[c\,x])^2\,\text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{c}-\frac{i\,m\,(a+b\,\text{ArcCos}[c\,x])^2\,\text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{c}+\frac{2\,b\,m\,(a+b\,\text{ArcCos}[c\,x])\,\text{PolyLog}\left[3,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{c}+\frac{2\,b\,m\,(a+b\,\text{ArcCos}[c\,x])\,\text{PolyLog}\left[3,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{c}+\frac{2\,i\,b^2\,m\,\text{PolyLog}\left[4,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{c}+\frac{2\,i\,b^2\,m\,\text{PolyLog}\left[4,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{c}$$

Result (type 8, 37 leaves):

$$\int \frac{(a+b\,\text{ArcCos}[c\,x])^2\,\text{Log}\left[h\,(f+g\,x)^m\right]}{\sqrt{1-c^2\,x^2}}\,dx$$

Problem 21: Result more than twice size of optimal antiderivative.

$$\int \frac{(a+b\,\text{ArcCos}[c\,x])\,\text{Log}\left[h\,(f+g\,x)^m\right]}{\sqrt{1-c^2\,x^2}}\,dx$$

Optimal (type 4, 374 leaves, 11 steps):

$$-\frac{i\,m\,(a+b\,\text{ArcCos}[c\,x])^3}{6\,b^2\,c}+\frac{m\,(a+b\,\text{ArcCos}[c\,x])^2\,\text{Log}\left[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{2\,b\,c}+\frac{m\,(a+b\,\text{ArcCos}[c\,x])^2\,\text{Log}\left[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{2\,b\,c}-\frac{(a+b\,\text{ArcCos}[c\,x])^2\,\text{Log}\left[h\,(f+g\,x)^m\right]}{2\,b\,c}-\frac{i\,m\,(a+b\,\text{ArcCos}[c\,x])\,\text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{c}-\frac{i\,m\,(a+b\,\text{ArcCos}[c\,x])\,\text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{c}+\frac{b\,m\,\text{PolyLog}\left[3,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f-\sqrt{c^2\,f^2-g^2}}\right]}{c}+\frac{b\,m\,\text{PolyLog}\left[3,-\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c\,f+\sqrt{c^2\,f^2-g^2}}\right]}{c}$$

Result (type 4, 1248 leaves) :

$$\frac{1}{6c}\Bigg(-3\,i\,a\,m\,\text{ArcCos}[c\,x]^2 - i\,b\,m\,\text{ArcCos}[c\,x]^3 + 24\,i\,a\,m\,\text{ArcSin}\Big[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\Big]\,\text{ArcTan}\Big[\frac{(c f - g)\,\text{Tan}\big[\frac{1}{2}\text{ArcCos}[c\,x]\big]}{\sqrt{c^2 f^2 - g^2}}\Big] +$$

$$3\,b\,m\,\text{ArcCos}[c\,x]^2\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c f - \sqrt{c^2 f^2 - g^2}}\Big] + 6\,a\,m\,\text{ArcCos}[c\,x]\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f - \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] +$$

$$3\,b\,m\,\text{ArcCos}[c\,x]^2\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f - \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] + 12\,a\,m\,\text{ArcSin}\Big[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\Big]\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f - \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] +$$

$$12\,b\,m\,\text{ArcCos}[c\,x]\,\text{ArcSin}\Big[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\Big]\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f - \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] +$$

$$3\,b\,m\,\text{ArcCos}[c\,x]^2\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\,g}{c f + \sqrt{c^2 f^2 - g^2}}\Big] + 6\,a\,m\,\text{ArcCos}[c\,x]\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f + \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] +$$

$$3\,b\,m\,\text{ArcCos}[c\,x]^2\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f + \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] - 12\,a\,m\,\text{ArcSin}\Big[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\Big]\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f + \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] -$$

$$12\,b\,m\,\text{ArcCos}[c\,x]\,\text{ArcSin}\Big[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\Big]\,\text{Log}\Big[1+\frac{e^{i\,\text{ArcCos}[c\,x]}\left(c f + \sqrt{c^2 f^2 - g^2}\right)}{g}\Big] - 6\,a\,m\,\text{ArcCos}[c\,x]\,\text{Log}[f+g\,x] - 6\,a\,m\,\text{ArcSin}[c\,x]\,\text{Log}[f+g\,x] -$$

$$3\,b\,\text{ArcCos}[c\,x]^2\,\text{Log}\big[h\,(f+g\,x)^m\big] + 6\,a\,\text{ArcSin}[c\,x]\,\text{Log}\big[h\,(f+g\,x)^m\big] - 3\,b\,m\,\text{ArcCos}[c\,x]^2\,\text{Log}\Big[1+\frac{\left(c f - \sqrt{c^2 f^2 - g^2}\right)\left(c\,x + i\,\sqrt{1-c^2 x^2}\right)}{g}\Big] -$$

$$12\,b\,m\,\text{ArcCos}[c\,x]\,\text{ArcSin}\Big[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\Big]\,\text{Log}\Big[1+\frac{\left(c f - \sqrt{c^2 f^2 - g^2}\right)\left(c\,x + i\,\sqrt{1-c^2 x^2}\right)}{g}\Big] -$$

$$3\, b\, m\, \text{ArcCos}[c\, x]^2\, \text{Log}\left[1+\frac{\left(c\, f+\sqrt{c^2 f^2-g^2}\right)\left(c\, x+i\sqrt{1-c^2 x^2}\right)}{g}\right]+$$

$$12\, b\, m\, \text{ArcCos}[c\, x]\, \text{ArcSin}\left[\frac{\sqrt{1+\frac{c f}{g}}}{\sqrt{2}}\right]\text{Log}\left[1+\frac{\left(c\, f+\sqrt{c^2 f^2-g^2}\right)\left(c\, x+i\sqrt{1-c^2 x^2}\right)}{g}\right]-6\, i\, b\, m\, \text{ArcCos}[c\, x]\, \text{PolyLog}\left[2,\frac{e^{i\,\text{ArcCos}[c\, x]}\, g}{-c\, f+\sqrt{c^2 f^2-g^2}}\right]-$$

$$6\, i\, a\, m\, \text{PolyLog}\left[2,\frac{e^{i\,\text{ArcCos}[c\, x]}\left(-c\, f+\sqrt{c^2 f^2-g^2}\right)}{g}\right]-6\, i\, b\, m\, \text{ArcCos}[c\, x]\, \text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c\, x]}\, g}{c\, f+\sqrt{c^2 f^2-g^2}}\right]-$$

$$\left.6\, i\, a\, m\, \text{PolyLog}\left[2,-\frac{e^{i\,\text{ArcCos}[c\, x]}\left(c\, f+\sqrt{c^2 f^2-g^2}\right)}{g}\right]+6\, b\, m\, \text{PolyLog}\left[3,\frac{e^{i\,\text{ArcCos}[c\, x]}\, g}{-c\, f+\sqrt{c^2 f^2-g^2}}\right]+6\, b\, m\, \text{PolyLog}\left[3,-\frac{e^{i\,\text{ArcCos}[c\, x]}\, g}{c\, f+\sqrt{c^2 f^2-g^2}}\right]\right)$$

Problem 22: Attempted integration timed out after 120 seconds.

$$\int \frac{\text{Log}\left[h\,(f+g\,x)^m\right]}{\sqrt{1-c^2 x^2}}\, dx$$

Optimal (type 4, 237 leaves, 9 steps):

$$\frac{i\, m\, \text{ArcSin}[c\, x]^2}{2\, c}-\frac{m\, \text{ArcSin}[c\, x]\, \text{Log}\left[1-\frac{i\, e^{i\,\text{ArcSin}[c\, x]}\, g}{c\, f-\sqrt{c^2 f^2-g^2}}\right]}{c}-\frac{m\, \text{ArcSin}[c\, x]\, \text{Log}\left[1-\frac{i\, e^{i\,\text{ArcSin}[c\, x]}\, g}{c\, f+\sqrt{c^2 f^2-g^2}}\right]}{c}+$$

$$\frac{\text{ArcSin}[c\, x]\, \text{Log}\left[h\,(f+g\,x)^m\right]}{c}+\frac{i\, m\, \text{PolyLog}\left[2,\frac{i\, e^{i\,\text{ArcSin}[c\, x]}\, g}{c\, f-\sqrt{c^2 f^2-g^2}}\right]}{c}+\frac{i\, m\, \text{PolyLog}\left[2,\frac{i\, e^{i\,\text{ArcSin}[c\, x]}\, g}{c\, f+\sqrt{c^2 f^2-g^2}}\right]}{c}$$

Result (type 1, 1 leaves):

???

Problem 48: Result unnecessarily involves imaginary or complex numbers.

$$\int x^2\, \text{ArcCos}\left[a\, x^2\right] dx$$

Optimal (type 4, 55 leaves, 4 steps):

$$-\frac{2 x \sqrt{1-a^2 x^4}}{9 a}+\frac{1}{3} x^3 \text{ArcCos}\left[a x^2\right]+\frac{2 \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{a} x\right],-1\right]}{9 a^{3/2}}$$

Result (type 4, 63 leaves):

$$\frac{1}{9}\left(-\frac{2 x \sqrt{1-a^2 x^4}}{a}+3 x^3 \text{ArcCos}\left[a x^2\right]+\frac{2 \text{i} \text{EllipticF}\left[\text{i} \text{ArcSinh}\left[\sqrt{-a} x\right],-1\right]}{(-a)^{3/2}}\right)$$

Problem 50: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{ArcCos}\left[a x^2\right] \, dx$$

Optimal (type 4, 43 leaves, 6 steps):

$$x \text{ArcCos}\left[a x^2\right]+\frac{2 \text{EllipticE}\left[\text{ArcSin}\left[\sqrt{a} x\right],-1\right]}{\sqrt{a}}-\frac{2 \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{a} x\right],-1\right]}{\sqrt{a}}$$

Result (type 4, 56 leaves):

$$x \text{ArcCos}\left[a x^2\right]+\frac{2 \text{i} a \left(\text{EllipticE}\left[\text{i} \text{ArcSinh}\left[\sqrt{-a} x\right],-1\right]-\text{EllipticF}\left[\text{i} \text{ArcSinh}\left[\sqrt{-a} x\right],-1\right]\right)}{(-a)^{3/2}}$$

Problem 52: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{ArcCos}\left[a x^2\right]}{x^2} \, dx$$

Optimal (type 4, 29 leaves, 3 steps):

$$-\frac{\text{ArcCos}\left[a x^2\right]}{x}-2 \sqrt{a} \text{EllipticF}\left[\text{ArcSin}\left[\sqrt{a} x\right],-1\right]$$

Result (type 4, 40 leaves):

$$-\frac{\text{ArcCos}\left[a x^2\right]+2 \text{i} \sqrt{-a} x \text{EllipticF}\left[\text{i} \text{ArcSinh}\left[\sqrt{-a} x\right],-1\right]}{x}$$

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

$$\int \text{ArcCos}\left[\frac{a}{x}\right] \, dx$$

Optimal (type 3, 27 leaves, 5 steps):

$$x\,\text{ArcSec}\left[\frac{x}{a}\right]-a\,\text{ArcTanh}\left[\sqrt{1-\frac{a^2}{x^2}}\right]$$

Result (type 3, 84 leaves):

$$x\,\text{ArcCos}\left[\frac{a}{x}\right]-\frac{a\sqrt{-a^2+x^2}\left(-\text{Log}\left[1-\frac{x}{\sqrt{-a^2+x^2}}\right]+\text{Log}\left[1+\frac{x}{\sqrt{-a^2+x^2}}\right]\right)}{2\sqrt{1-\frac{a^2}{x^2}}\,x}$$

Problem 102: Unable to integrate problem.

$$\int\frac{\left(a+b\,\text{ArcCos}\left[\frac{\sqrt{1-c\,x}}{\sqrt{1+c\,x}}\right]\right)^3}{1-c^2\,x^2}\,dx$$

Optimal (type 4, 279 leaves, 8 steps):

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

Result (type 8, 42 leaves):

$$\int\frac{\left(a+b\,\text{ArcCos}\left[\frac{\sqrt{1-c\,x}}{\sqrt{1+c\,x}}\right]\right)^3}{1-c^2\,x^2}\,dx$$

Problem 103: Unable to integrate problem.

$$\int\frac{\left(a+b\,\text{ArcCos}\left[\frac{\sqrt{1-c\,x}}{\sqrt{1+c\,x}}\right]\right)^2}{1-c^2\,x^2}\,dx$$

Optimal (type 4, 207 leaves, 7 steps):

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

Result (type 8, 42 leaves) :

$$\int \frac{\left(a+b\,\text{ArcCos}\left[\frac{\sqrt{1-c x}}{\sqrt{1+c x}}\right]\right)^2}{1-c^2 x^2}\,dx$$

Problem 104: Unable to integrate problem.

$$\int \frac{a+b\,\text{ArcCos}\left[\frac{\sqrt{1-c x}}{\sqrt{1+c x}}\right]}{1-c^2 x^2}\,dx$$

Optimal (type 4, 141 leaves, 6 steps) :

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

Result (type 8, 40 leaves) :

$$\int \frac{a+b\,\text{ArcCos}\left[\frac{\sqrt{1-c x}}{\sqrt{1+c x}}\right]}{1-c^2 x^2}\,dx$$

Problem 107: Attempted integration timed out after 120 seconds.

$$\int \text{ArcCos}\left[c\, e^{a+b x}\right]\,dx$$

Optimal (type 4, 84 leaves, 6 steps) :

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

Result (type 1, 1 leaves) :

???

Problem 114: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

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

Optimal (type 3, 48 leaves, 6 steps):

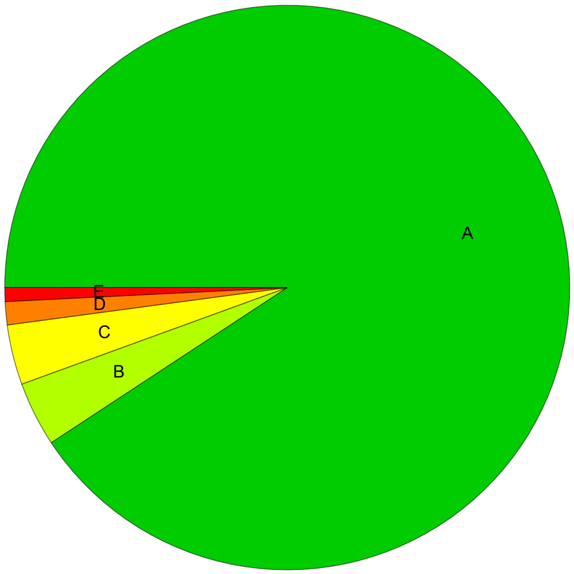
$$\frac{(a+b\,x)\,\text{ArcSec}\left[\frac{a}{c}+\frac{b\,x}{c}\right]}{b}-\frac{c\,\text{ArcTanh}\left[\sqrt{1-\frac{c^2}{(a+b\,x)^2}}\right]}{b}$$

Result (type 3, 167 leaves):

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

Summary of Integration Test Results

378 integration problems



A - 343 optimal antiderivatives

B - 14 more than twice size of optimal antiderivatives

C - 13 unnecessarily complex antiderivatives

D - 5 unable to integrate problems

E - 3 integration timeouts