Maple 2018.2 Integration Test Results
on the problems in "5 Inverse trig functions/5.2 Inverse cosine"

Test results for the 59 problems in "5.2.2 (d x)^m (a+b arccos(c x))^n.txt"

Problem 13: Unable to integrate problem.

$$\int \frac{\arccos(a x)^4}{x^2}\, dx$$

Optimal(type 4, 228 leaves, 11 steps):

$$-\frac{\arccos(a x)^4}{x} - 8 I a \arccos(a x)^3 \arctan\left(a x + I\sqrt{-a^2 x^2 + 1}\right) + 12 I a \arccos(a x)^2 \operatorname{polylog}\left(2, -I\left(a x + I\sqrt{-a^2 x^2 + 1}\right)\right) - 12 I a \arccos(a x)^2 \operatorname{polylog}\left(2, I\left(a x + I\sqrt{-a^2 x^2 + 1}\right)\right) - 24 a \arccos(a x) \operatorname{polylog}\left(3, -I\left(a x + I\sqrt{-a^2 x^2 + 1}\right)\right) + 24 a \arccos(a x) \operatorname{polylog}\left(3, I\left(a x + I\sqrt{-a^2 x^2 + 1}\right)\right) - 24 I a \operatorname{polylog}\left(4, -I\left(a x + I\sqrt{-a^2 x^2 + 1}\right)\right) + 24 I a \operatorname{polylog}\left(4, I\left(a x + I\sqrt{-a^2 x^2 + 1}\right)\right)$$

Result(type 8, 12 leaves):

$$\int \frac{\arccos(a x)^4}{x^2}\, dx$$

Problem 36: Unable to integrate problem.

$$\int (b x)^m \arccos(a x)\, dx$$

Optimal(type 5, 64 leaves, 2 steps):

$$\frac{(b x)^{1+m} \arccos(a x)}{b (1+m)} + \frac{a (b x)^{2+m} \operatorname{hypergeom}\left(\left[\frac{1}{2}, 1 + \frac{m}{2}\right], \left[2 + \frac{m}{2}\right], a^2 x^2\right)}{b^2 (1+m) (2+m)}$$

Result(type 8, 12 leaves):

$$\int (b x)^m \arccos(a x)\, dx$$

Problem 39: Unable to integrate problem.

$$\int x^2 \arccos(a x)^n\, dx$$

Optimal(type 4, 147 leaves, 9 steps):

$$\frac{\arccos(a x)^n \Gamma(1+n, -I \arccos(a x))}{8 a^3 (-I \arccos(a x))^n} + \frac{\arccos(a x)^n \Gamma(1+n, I \arccos(a x))}{8 a^3 (I \arccos(a x))^n} + \frac{3^{-1-n} \arccos(a x)^n \Gamma(1+n, -3 I \arccos(a x))}{8 a^3 (-I \arccos(a x))^n} + \frac{3^{-1-n} \arccos(a x)^n \Gamma(1+n, 3 I \arccos(a x))}{8 a^3 (I \arccos(a x))^n}$$

Result(type 8, 12 leaves):

$$\int x^2 \arccos(a x)^n \, dx$$

Problem 40: Unable to integrate problem.

$$\int \arccos(a x)^n \, dx$$

Optimal(type 4, 67 leaves, 4 steps):

$$\frac{\arccos(a x)^n \Gamma(1+n, -I \arccos(a x))}{2 a (-I \arccos(a x))^n} + \frac{\arccos(a x)^n \Gamma(1+n, I \arccos(a x))}{2 a (I \arccos(a x))^n}$$

Result(type 9, 147 leaves):

$$-\frac{1}{a}\left(2^n \sqrt{\pi}\left(\frac{\arccos(a x)^{1+n} 2^{-n} \sqrt{-a^2 x^2+1}}{\sqrt{\pi}\,(2+n)} - \frac{2^{-n} \sqrt{\arccos(a x)}\ \mathrm{LommelS1}\left(n+\frac{3}{2}, \frac{3}{2}, \arccos(a x)\right) \sqrt{-a^2 x^2+1}}{\sqrt{\pi}\,(2+n)} - \frac{3\, 2^{-1-n}\left(\frac{4}{3}+\frac{2 n}{3}\right)\left(a x \arccos(a x) - \sqrt{-a^2 x^2+1}\right) \mathrm{LommelS1}\left(n+\frac{1}{2}, \frac{1}{2}, \arccos(a x)\right)}{\sqrt{\pi}\,(2+n) \sqrt{\arccos(a x)}}\right)\right)$$

Problem 46: Result more than twice size of optimal antiderivative.

$$\int \frac{(a+b \arccos(c x))^3}{x} \, dx$$

Optimal(type 4, 160 leaves, 7 steps):

$$-\frac{I (a+b \arccos(c x))^4}{4 b} + (a+b \arccos(c x))^3 \ln\left(1+\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right) - \frac{3 I b (a+b \arccos(c x))^2 \operatorname{polylog}\left(2, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{2} + \frac{3 b^2 (a+b \arccos(c x)) \operatorname{polylog}\left(3, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{2} + \frac{3 I b^3 \operatorname{polylog}\left(4, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{4}$$

Result(type 4, 352 leaves):

$$a^3 \ln(c x) - \frac{I b^3 \arccos(c x)^4}{4} + b^3 \arccos(c x)^3 \ln\left(1+\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right) - \frac{3 I b^3 \arccos(c x)^2 \operatorname{polylog}\left(2, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{2} + \frac{3 b^3 \arccos(c x) \operatorname{polylog}\left(3, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{2} + \frac{3 I b^3 \operatorname{polylog}\left(4, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{4} - I a b^2 \arccos(c x)^3 + 3 a b^2 \arccos(c x)^2 \ln\left(1 + \left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right) - 3 I a b^2 \arccos(c x) \operatorname{polylog}\left(2, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right) + \frac{3 a b^2 \operatorname{polylog}\left(3, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{2} - \frac{3 I a^2 b \arccos(c x)^2}{2} + 3 a^2 b \arccos(c x) \ln\left(1+\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right) - \frac{3 I a^2 b \operatorname{polylog}\left(2, -\left(c x+I \sqrt{-c^2 x^2+1}\right)^2\right)}{2}$$

Problem 52: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{(a+b\arccos(cx))^{5/2}}\,dx$$

Optimal(type 4, 129 leaves, 8 steps):

$$\frac{4\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arccos(cx)}}{\sqrt{\pi}\,\sqrt{b}}\right)\sqrt{2}\,\sqrt{\pi}}{3\,b^{5/2}\,c}-\frac{4\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arccos(cx)}}{\sqrt{\pi}\,\sqrt{b}}\right)\sin\left(\frac{a}{b}\right)\sqrt{2}\,\sqrt{\pi}}{3\,b^{5/2}\,c}+\frac{2\sqrt{-c^2x^2+1}}{3\,b\,c\,(a+b\arccos(cx))^{3/2}}+\frac{4\,x}{3\,b^2\sqrt{a+b\arccos(cx)}}$$

Result(type 4, 324 leaves):

$$-\frac{1}{3\,c\,b^2\,(a+b\arccos(cx))^{3/2}}\Bigg(2\Bigg(2\arccos(cx)\sin\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arccos(cx)}}{\sqrt{\pi}\,\sqrt{\frac{1}{b}}\,b}\right)\sqrt{\frac{1}{b}}\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{a+b\arccos(cx)}\,b$$
$$-2\arccos(cx)\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arccos(cx)}}{\sqrt{\pi}\,\sqrt{\frac{1}{b}}\,b}\right)\sqrt{\frac{1}{b}}\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{a+b\arccos(cx)}\,b$$
$$+2\sin\left(\frac{a}{b}\right)\operatorname{FresnelC}\left(\frac{\sqrt{2}\,\sqrt{a+b\arccos(cx)}}{\sqrt{\pi}\,\sqrt{\frac{1}{b}}\,b}\right)\sqrt{\frac{1}{b}}\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{a+b\arccos(cx)}\,a$$
$$-2\cos\left(\frac{a}{b}\right)\operatorname{FresnelS}\left(\frac{\sqrt{2}\,\sqrt{a+b\arccos(cx)}}{\sqrt{\pi}\,\sqrt{\frac{1}{b}}\,b}\right)\sqrt{\frac{1}{b}}\,\sqrt{2}\,\sqrt{\pi}\,\sqrt{a+b\arccos(cx)}\,a-2\arccos(cx)\cos\left(\frac{a+b\arccos(cx)}{b}-\frac{a}{b}\right)b$$
$$-\sin\left(\frac{a+b\arccos(cx)}{b}-\frac{a}{b}\right)b-2\cos\left(\frac{a+b\arccos(cx)}{b}-\frac{a}{b}\right)a\Bigg)\Bigg)$$

Test results for the 11 problems in "5.2.4 (f x)^m (d+e x^2)^p (a+b arccos(c x))^n.txt"

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

$$\int \frac{a+b\arccos(cx)}{x^3\,(-c^2dx^2+d)}\,dx$$

Optimal(type 4, 148 leaves, 9 steps):

$$\frac{-a-b\arccos(cx)}{2\,d\,x^2}+\frac{2\,c^2\,(a+b\arccos(cx))\operatorname{arctanh}\left(\left(cx+I\sqrt{-c^2x^2+1}\right)^2\right)}{d}-\frac{I\,b\,c^2\operatorname{polylog}\left(2,-\left(cx+I\sqrt{-c^2x^2+1}\right)^2\right)}{2\,d}$$

$$+\frac{I b c^2 \operatorname{polylog}\left(2, \left(c x+I\sqrt{-c^2 x^2+1}\right)^2\right)}{2 d}+\frac{b c\sqrt{-c^2 x^2+1}}{2 d x}$$

Result(type 4, 300 leaves):

$$-\frac{c^2 a \ln(c x+1)}{2 d}-\frac{c^2 a \ln(c x-1)}{2 d}-\frac{a}{2 d x^2}+\frac{c^2 a \ln(c x)}{d}+\frac{I c^2 b}{2 d}+\frac{b c\sqrt{-c^2 x^2+1}}{2 d x}-\frac{b \arccos(c x)}{2 d x^2}-\frac{c^2 b \arccos(c x) \ln\left(1+c x+I\sqrt{-c^2 x^2+1}\right)}{d}$$
$$+\frac{I c^2 b \operatorname{polylog}\left(2, -c x-I\sqrt{-c^2 x^2+1}\right)}{d}-\frac{c^2 b \arccos(c x) \ln\left(1-c x-I\sqrt{-c^2 x^2+1}\right)}{d}+\frac{I c^2 b \operatorname{polylog}\left(2, c x+I\sqrt{-c^2 x^2+1}\right)}{d}$$
$$+\frac{c^2 b \arccos(c x) \ln\left(1+\left(c x+I\sqrt{-c^2 x^2+1}\right)^2\right)}{d}-\frac{I b c^2 \operatorname{polylog}\left(2, -\left(c x+I\sqrt{-c^2 x^2+1}\right)^2\right)}{2 d}$$

Test results for the 33 problems in "5.2.5 Inverse cosine functions.txt"

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

$$\int (g x+f)^3 (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}\, dx$$

Optimal(type 3, 590 leaves, 16 steps):

$$\frac{f^3 x (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}}{2}-\frac{3 f g^2 x (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}}{8 c^2}+\frac{3 f g^2 x^3 (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}}{4}$$
$$-\frac{f^2 g \left(-c^2 x^2+1\right) (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}}{c^2}-\frac{g^3 \left(-c^2 x^2+1\right) (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}}{3 c^4}$$
$$+\frac{g^3 \left(-c^2 x^2+1\right)^2 (a+b \arccos(c x)) \sqrt{-c^2 d x^2+d}}{5 c^4}-\frac{b f^2 g x\sqrt{-c^2 d x^2+d}}{c\sqrt{-c^2 x^2+1}}-\frac{2 b g^3 x\sqrt{-c^2 d x^2+d}}{15 c^3 \sqrt{-c^2 x^2+1}}+\frac{b c f^3 x^2 \sqrt{-c^2 d x^2+d}}{4 \sqrt{-c^2 x^2+1}}$$
$$-\frac{3 b f g^2 x^2 \sqrt{-c^2 d x^2+d}}{16 c\sqrt{-c^2 x^2+1}}+\frac{b c f^2 g x^3 \sqrt{-c^2 d x^2+d}}{3 \sqrt{-c^2 x^2+1}}-\frac{b g^3 x^3 \sqrt{-c^2 d x^2+d}}{45 c\sqrt{-c^2 x^2+1}}+\frac{3 b c f g^2 x^4 \sqrt{-c^2 d x^2+d}}{16 \sqrt{-c^2 x^2+1}}+\frac{b c g^3 x^5 \sqrt{-c^2 d x^2+d}}{25 \sqrt{-c^2 x^2+1}}$$
$$-\frac{f^3 (a+b \arccos(c x))^2 \sqrt{-c^2 d x^2+d}}{4 b c\sqrt{-c^2 x^2+1}}-\frac{3 f g^2 (a+b \arccos(c x))^2 \sqrt{-c^2 d x^2+d}}{16 b c^3 \sqrt{-c^2 x^2+1}}$$

Result(type 3, 1284 leaves):

$$\frac{3 b\sqrt{-d \left(c^2 x^2-1\right)}\, f g^2 \sqrt{-c^2 x^2+1}\, x^2}{16 c \left(c^2 x^2-1\right)}-\frac{b\sqrt{-d \left(c^2 x^2-1\right)}\, g c\sqrt{-c^2 x^2+1}\, x^3 f^2}{3 \left(c^2 x^2-1\right)}+\frac{b\sqrt{-d \left(c^2 x^2-1\right)}\, g\sqrt{-c^2 x^2+1}\, x f^2}{c \left(c^2 x^2-1\right)}$$
$$+\frac{3 b\sqrt{-d \left(c^2 x^2-1\right)}\, f g^2 c^2 \arccos(c x)\, x^5}{4 \left(c^2 x^2-1\right)}+\frac{3 b\sqrt{-d \left(c^2 x^2-1\right)}\, f g^2 \arccos(c x)\, x}{8 c^2 \left(c^2 x^2-1\right)}+\frac{b\sqrt{-d \left(c^2 x^2-1\right)}\, g c^2 \arccos(c x)\, x^4 f^2}{c^2 x^2-1}$$

$$+\frac{3b\sqrt{-d(c^2x^2-1)}\sqrt{-c^2x^2+1}\arccos(cx)^2fg^2}{16c^3(c^2x^2-1)}-\frac{3b\sqrt{-d(c^2x^2-1)}fg^2c\sqrt{-c^2x^2+1}x^4}{16(c^2x^2-1)}+\frac{af^3d\arctan\left(\frac{\sqrt{c^2d}\,x}{\sqrt{-c^2dx^2+d}}\right)}{2\sqrt{c^2d}}$$

$$-\frac{2ag^3(-c^2dx^2+d)^{3/2}}{15dc^4}+\frac{b\sqrt{-d(c^2x^2-1)}g^3\sqrt{-c^2x^2+1}x^3}{45c(c^2x^2-1)}+\frac{2b\sqrt{-d(c^2x^2-1)}g^3\sqrt{-c^2x^2+1}x}{15c^3(c^2x^2-1)}-\frac{9b\sqrt{-d(c^2x^2-1)}fg^2\arccos(cx)x^3}{8(c^2x^2-1)}$$

$$-\frac{3b\sqrt{-d(c^2x^2-1)}fg^2\sqrt{-c^2x^2+1}}{128c^3(c^2x^2-1)}-\frac{2b\sqrt{-d(c^2x^2-1)}g\arccos(cx)x^2f^2}{c^2x^2-1}-\frac{b\sqrt{-d(c^2x^2-1)}f^3c\sqrt{-c^2x^2+1}x^2}{4(c^2x^2-1)}$$

$$-\frac{b\sqrt{-d(c^2x^2-1)}g^3c\sqrt{-c^2x^2+1}x^5}{25(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}g^3\arccos(cx)x^2}{15c^2(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}g\arccos(cx)f^2}{c^2(c^2x^2-1)}$$

$$+\frac{b\sqrt{-d(c^2x^2-1)}f^3c^2\arccos(cx)x^3}{2(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\sqrt{-c^2x^2+1}\arccos(cx)^2f^3}{4c(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}g^3c^2\arccos(cx)x^6}{5(c^2x^2-1)}$$

$$-\frac{ag^3x^2(-c^2dx^2+d)^{3/2}}{5c^2d}+\frac{3afg^2x\sqrt{-c^2dx^2+d}}{8c^2}-\frac{af^2g(-c^2dx^2+d)^{3/2}}{c^2d}+\frac{2b\sqrt{-d(c^2x^2-1)}g^3\arccos(cx)}{15c^4(c^2x^2-1)}$$

$$-\frac{b\sqrt{-d(c^2x^2-1)}f^3\arccos(cx)x}{2(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}f^3\sqrt{-c^2x^2+1}}{8c(c^2x^2-1)}-\frac{4b\sqrt{-d(c^2x^2-1)}g^3\arccos(cx)x^4}{15(c^2x^2-1)}+\frac{af^3x\sqrt{-c^2dx^2+d}}{2}$$

$$-\frac{3afg^2x(-c^2dx^2+d)^{3/2}}{4c^2d}+\frac{3afg^2d\arctan\left(\frac{\sqrt{c^2d}\,x}{\sqrt{-c^2dx^2+d}}\right)}{8c^2\sqrt{c^2d}}$$

Problem 2: Result more than twice size of optimal antiderivative.

$$\int (gx+f)\,(a+b\arccos(cx))\sqrt{-c^2dx^2+d}\,dx$$

Optimal(type 3, 206 leaves, 8 steps):

$$\frac{fx(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{2}-\frac{g(-c^2x^2+1)(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{3c^2}-\frac{bgx\sqrt{-c^2dx^2+d}}{3c\sqrt{-c^2x^2+1}}+\frac{bcfx^2\sqrt{-c^2dx^2+d}}{4\sqrt{-c^2x^2+1}}$$

$$+\frac{bcgx^3\sqrt{-c^2dx^2+d}}{9\sqrt{-c^2x^2+1}}-\frac{f(a+b\arccos(cx))^2\sqrt{-c^2dx^2+d}}{4bc\sqrt{-c^2x^2+1}}$$

Result(type 3, 490 leaves):

$$\frac{afx\sqrt{-c^2dx^2+d}}{2}+\frac{afd\arctan\left(\frac{\sqrt{c^2d}\,x}{\sqrt{-c^2dx^2+d}}\right)}{2\sqrt{c^2d}}-\frac{ag(-c^2dx^2+d)^{3/2}}{3c^2d}+\frac{b\sqrt{-d(c^2x^2-1)}g\arccos(cx)}{3c^2(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}gc\sqrt{-c^2x^2+1}x^3}{9(c^2x^2-1)}$$

$$+\frac{b\sqrt{-d(c^2x^2-1)}\,g\sqrt{-c^2x^2+1}\,x}{3c(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}\,fc\sqrt{-c^2x^2+1}\,x^2}{4(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,gc^2\arccos(cx)\,x^4}{3(c^2x^2-1)}$$
$$-\frac{2b\sqrt{-d(c^2x^2-1)}\,g\arccos(cx)\,x^2}{3(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,fc^2\arccos(cx)\,x^3}{2(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}\,f\arccos(cx)\,x}{2(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,f\sqrt{-c^2x^2+1}}{8c(c^2x^2-1)}$$
$$+\frac{b\sqrt{-d(c^2x^2-1)}\,\sqrt{-c^2x^2+1}\,\arccos(cx)^2f}{4c(c^2x^2-1)}$$

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

$$\int(gx+f)^2\left(-c^2dx^2+d\right)^{3/2}(a+b\arccos(cx))\,dx$$

Optimal(type 3, 596 leaves, 20 steps):

$$\frac{3df^2x(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{8}-\frac{dg^2x(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{16c^2}+\frac{dg^2x^3(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{8}$$
$$+\frac{df^2x\left(-c^2x^2+1\right)(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{4}+\frac{dg^2x^3\left(-c^2x^2+1\right)(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{6}$$
$$-\frac{2dfg\left(-c^2x^2+1\right)^2(a+b\arccos(cx))\sqrt{-c^2dx^2+d}}{5c^2}-\frac{2bdfgx\sqrt{-c^2dx^2+d}}{5c\sqrt{-c^2x^2+1}}+\frac{5bcdf^2x^2\sqrt{-c^2dx^2+d}}{16\sqrt{-c^2x^2+1}}-\frac{bdg^2x^2\sqrt{-c^2dx^2+d}}{32c\sqrt{-c^2x^2+1}}$$
$$+\frac{4bcdfgx^3\sqrt{-c^2dx^2+d}}{15\sqrt{-c^2x^2+1}}-\frac{bc^3df^2x^4\sqrt{-c^2dx^2+d}}{16\sqrt{-c^2x^2+1}}+\frac{7bcdg^2x^4\sqrt{-c^2dx^2+d}}{96\sqrt{-c^2x^2+1}}-\frac{2bc^3dfgx^5\sqrt{-c^2dx^2+d}}{25\sqrt{-c^2x^2+1}}-\frac{bc^3dg^2x^6\sqrt{-c^2dx^2+d}}{36\sqrt{-c^2x^2+1}}$$
$$-\frac{3df^2(a+b\arccos(cx))^2\sqrt{-c^2dx^2+d}}{16bc\sqrt{-c^2x^2+1}}-\frac{dg^2(a+b\arccos(cx))^2\sqrt{-c^2dx^2+d}}{32bc^3\sqrt{-c^2x^2+1}}$$

Result(type 3, 1251 leaves):

$$-\frac{6b\sqrt{-d(c^2x^2-1)}\,fgd\arccos(cx)\,x^2}{5(c^2x^2-1)}+\frac{af^2x\left(-c^2dx^2+d\right)^{3/2}}{4}+\frac{b\sqrt{-d(c^2x^2-1)}\,dc^3\sqrt{-c^2x^2+1}\,x^4f^2}{16(c^2x^2-1)}-\frac{5b\sqrt{-d(c^2x^2-1)}\,dc\sqrt{-c^2x^2+1}\,x^2f^2}{16(c^2x^2-1)}$$
$$+\frac{b\sqrt{-d(c^2x^2-1)}\,g^2dc^3\sqrt{-c^2x^2+1}\,x^6}{36(c^2x^2-1)}-\frac{7b\sqrt{-d(c^2x^2-1)}\,g^2dc\sqrt{-c^2x^2+1}\,x^4}{96(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,g^2d\sqrt{-c^2x^2+1}\,x^2}{32c(c^2x^2-1)}$$
$$+\frac{2b\sqrt{-d(c^2x^2-1)}\,fgd\arccos(cx)}{5c^2(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}\,dc^4\arccos(cx)\,x^5f^2}{4(c^2x^2-1)}+\frac{7b\sqrt{-d(c^2x^2-1)}\,dc^2\arccos(cx)\,x^3f^2}{8(c^2x^2-1)}$$
$$+\frac{3b\sqrt{-d(c^2x^2-1)}\,\sqrt{-c^2x^2+1}\,\arccos(cx)^2df^2}{16c(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,\sqrt{-c^2x^2+1}\,\arccos(cx)^2dg^2}{32c^3(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}\,g^2dc^4\arccos(cx)\,x^7}{6(c^2x^2-1)}$$
$$+\frac{11b\sqrt{-d(c^2x^2-1)}\,g^2dc^2\arccos(cx)\,x^5}{24(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,g^2d\arccos(cx)\,x}{16c^2(c^2x^2-1)}-\frac{2b\sqrt{-d(c^2x^2-1)}\,fgdc^4\arccos(cx)\,x^6}{5(c^2x^2-1)}$$

$$+\frac{6 b \sqrt{-d(c^2x^2-1)}\, f g d c^2 \arccos(cx) x^4}{5(c^2x^2-1)}+\frac{2 b \sqrt{-d(c^2x^2-1)}\, f g d c^3 \sqrt{-c^2x^2+1}\, x^5}{25(c^2x^2-1)}-\frac{4 b \sqrt{-d(c^2x^2-1)}\, f g d c \sqrt{-c^2x^2+1}\, x^3}{15(c^2x^2-1)}$$

$$+\frac{2 b \sqrt{-d(c^2x^2-1)}\, f g d \sqrt{-c^2x^2+1}\, x}{5c(c^2x^2-1)}+\frac{a g^2 x(-c^2dx^2+d)^{3/2}}{24c^2}+\frac{3 a f^2 d^2 \arctan\left(\frac{\sqrt{c^2d}\, x}{\sqrt{-c^2dx^2+d}}\right)}{8\sqrt{c^2d}}+\frac{3 a f^2 d x\sqrt{-c^2dx^2+d}}{8}$$

$$-\frac{5 b \sqrt{-d(c^2x^2-1)}\, d \arccos(cx) x f^2}{8(c^2x^2-1)}+\frac{17 b \sqrt{-d(c^2x^2-1)}\, d \sqrt{-c^2x^2+1}\, f^2}{128 c(c^2x^2-1)}-\frac{17 b \sqrt{-d(c^2x^2-1)}\, g^2 d \arccos(cx) x^3}{48(c^2x^2-1)}$$

$$+\frac{7 b \sqrt{-d(c^2x^2-1)}\, g^2 d \sqrt{-c^2x^2+1}}{2304 c^3(c^2x^2-1)}-\frac{a g^2 x(-c^2dx^2+d)^{5/2}}{6c^2d}+\frac{a g^2 d x\sqrt{-c^2dx^2+d}}{16c^2}+\frac{a g^2 d^2 \arctan\left(\frac{\sqrt{c^2d}\, x}{\sqrt{-c^2dx^2+d}}\right)}{16c^2\sqrt{c^2d}}$$

$$-\frac{2 a f g(-c^2dx^2+d)^{5/2}}{5c^2d}$$

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

$$\int \frac{(gx+f)^2(a+b\arccos(cx))}{\sqrt{-c^2dx^2+d}}\, dx$$

Optimal(type 3, 242 leaves, 9 steps):

$$-\frac{2fg(-c^2x^2+1)(a+b\arccos(cx))}{c^2\sqrt{-c^2dx^2+d}}-\frac{g^2x(-c^2x^2+1)(a+b\arccos(cx))}{2c^2\sqrt{-c^2dx^2+d}}-\frac{2bfgx\sqrt{-c^2x^2+1}}{c\sqrt{-c^2dx^2+d}}-\frac{bg^2x^2\sqrt{-c^2x^2+1}}{4c\sqrt{-c^2dx^2+d}}$$

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

Result(type 3, 548 leaves):

$$\frac{a f^2 \arctan\left(\frac{\sqrt{c^2d}\, x}{\sqrt{-c^2dx^2+d}}\right)}{\sqrt{c^2d}}-\frac{a g^2 x\sqrt{-c^2dx^2+d}}{2c^2d}+\frac{a g^2 \arctan\left(\frac{\sqrt{c^2d}\, x}{\sqrt{-c^2dx^2+d}}\right)}{2c^2\sqrt{c^2d}}-\frac{2afg\sqrt{-c^2dx^2+d}}{c^2d}$$

$$+\frac{b\sqrt{-d(c^2x^2-1)}\,\sqrt{-c^2x^2+1}\,\arccos(cx)^2 f^2}{2cd(c^2x^2-1)}+\frac{b\sqrt{-d(c^2x^2-1)}\,\sqrt{-c^2x^2+1}\,\arccos(cx)^2 g^2}{4c^3d(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}\, g^2\arccos(cx)x^3}{2d(c^2x^2-1)}$$

$$+\frac{b\sqrt{-d(c^2x^2-1)}\, g^2\arccos(cx)x}{2c^2d(c^2x^2-1)}-\frac{b\sqrt{-d(c^2x^2-1)}\, g^2\sqrt{-c^2x^2+1}}{8c^3d(c^2x^2-1)}+\frac{2b\sqrt{-d(c^2x^2-1)}\, fg\arccos(cx)}{c^2d(c^2x^2-1)}$$

$$+\frac{b\sqrt{-d\left(c^2x^2-1\right)}\,g^2\sqrt{-c^2x^2+1}\,x^2}{4cd\left(c^2x^2-1\right)}-\frac{2b\sqrt{-d\left(c^2x^2-1\right)}\,fg\arccos(cx)\,x^2}{d\left(c^2x^2-1\right)}+\frac{2b\sqrt{-d\left(c^2x^2-1\right)}\,fg\sqrt{-c^2x^2+1}\,x}{cd\left(c^2x^2-1\right)}$$

Problem 6: Result more than twice size of optimal antiderivative.

$$\int\frac{(gx+f)\,(a+b\arccos(cx))}{\sqrt{-c^2dx^2+d}}\,dx$$

Optimal(type 3, 115 leaves, 6 steps):

$$-\frac{g\left(-c^2x^2+1\right)(a+b\arccos(cx))}{c^2\sqrt{-c^2dx^2+d}}-\frac{bgx\sqrt{-c^2x^2+1}}{c\sqrt{-c^2dx^2+d}}-\frac{f(a+b\arccos(cx))^2\sqrt{-c^2x^2+1}}{2bc\sqrt{-c^2dx^2+d}}$$

Result(type 3, 234 leaves):

$$\frac{af\arctan\left(\frac{\sqrt{c^2d}\,x}{\sqrt{-c^2dx^2+d}}\right)}{\sqrt{c^2d}}-\frac{ag\sqrt{-c^2dx^2+d}}{c^2d}+\frac{b\sqrt{-d\left(c^2x^2-1\right)}\sqrt{-c^2x^2+1}\arccos(cx)^2f}{2c\left(c^2x^2-1\right)d}-\frac{bg\sqrt{-d\left(c^2x^2-1\right)}\arccos(cx)\,x^2}{d\left(c^2x^2-1\right)}$$
$$+\frac{bg\sqrt{-d\left(c^2x^2-1\right)}\sqrt{-c^2x^2+1}\,x}{cd\left(c^2x^2-1\right)}+\frac{bg\sqrt{-d\left(c^2x^2-1\right)}\arccos(cx)}{c^2d\left(c^2x^2-1\right)}$$

Problem 8: Result more than twice size of optimal antiderivative.

$$\int\frac{a+b\arccos(cx)}{(gx+f)^2\sqrt{-c^2dx^2+d}}\,dx$$

Optimal(type 4, 492 leaves, 13 steps):

$$\frac{g\left(-c^2x^2+1\right)(a+b\arccos(cx))}{\left(c^2f^2-g^2\right)(gx+f)\sqrt{-c^2dx^2+d}}+\frac{bc\ln(gx+f)\sqrt{-c^2x^2+1}}{\left(c^2f^2-g^2\right)\sqrt{-c^2dx^2+d}}+\frac{\mathrm{I}c^2f(a+b\arccos(cx))\ln\left(1+\frac{\left(cx+\mathrm{I}\sqrt{-c^2x^2+1}\right)g}{cf-\sqrt{c^2f^2-g^2}}\right)\sqrt{-c^2x^2+1}}{\left(c^2f^2-g^2\right)^{3/2}\sqrt{-c^2dx^2+d}}$$
$$-\frac{\mathrm{I}c^2f(a+b\arccos(cx))\ln\left(1+\frac{\left(cx+\mathrm{I}\sqrt{-c^2x^2+1}\right)g}{cf+\sqrt{c^2f^2-g^2}}\right)\sqrt{-c^2x^2+1}}{\left(c^2f^2-g^2\right)^{3/2}\sqrt{-c^2dx^2+d}}+\frac{bc^2f\,\mathrm{polylog}\left(2,-\frac{\left(cx+\mathrm{I}\sqrt{-c^2x^2+1}\right)g}{cf-\sqrt{c^2f^2-g^2}}\right)\sqrt{-c^2x^2+1}}{\left(c^2f^2-g^2\right)^{3/2}\sqrt{-c^2dx^2+d}}$$
$$-\frac{bc^2f\,\mathrm{polylog}\left(2,-\frac{\left(cx+\mathrm{I}\sqrt{-c^2x^2+1}\right)g}{cf+\sqrt{c^2f^2-g^2}}\right)\sqrt{-c^2x^2+1}}{\left(c^2f^2-g^2\right)^{3/2}\sqrt{-c^2dx^2+d}}$$

Result(type 4, 1621 leaves):

$$\frac{a\sqrt{-\left(x+\frac{f}{g}\right)^{2}c^{2}d+\frac{2c^{2}df\left(x+\frac{f}{g}\right)}{g}-\frac{d\left(c^{2}f^{2}-g^{2}\right)}{g^{2}}}}{d\left(c^{2}f^{2}-g^{2}\right)\left(x+\frac{f}{g}\right)}$$

$$-\frac{ac^{2}f\ln\left(\frac{-\frac{2d\left(c^{2}f^{2}-g^{2}\right)}{g^{2}}+\frac{2c^{2}df\left(x+\frac{f}{g}\right)}{g}+2\sqrt{-\frac{d\left(c^{2}f^{2}-g^{2}\right)}{g^{2}}}\sqrt{-\left(x+\frac{f}{g}\right)^{2}c^{2}d+\frac{2c^{2}df\left(x+\frac{f}{g}\right)}{g}-\frac{d\left(c^{2}f^{2}-g^{2}\right)}{g^{2}}}}{x+\frac{f}{g}}\right)}{g\left(c^{2}f^{2}-g^{2}\right)\sqrt{-\frac{d\left(c^{2}f^{2}-g^{2}\right)}{g^{2}}}}$$

$$+\frac{b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)\left(-c^{2}x^{2}+1\right)xc^{2}f}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}+\frac{b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)x^{3}c^{4}f}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}$$

$$-\frac{\mathrm{I}bc^{2}\sqrt{-d\left(c^{2}x^{2}-1\right)}\sqrt{-c^{2}x^{2}+1}\arccos(cx)\ln\left(\frac{-\left(cx+\mathrm{I}\sqrt{-c^{2}x^{2}+1}\right)g-cf+\sqrt{c^{2}f^{2}-g^{2}}}{-cf+\sqrt{c^{2}f^{2}-g^{2}}}\right)f}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)^{3/2}}+\frac{b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)x^{2}c^{2}g}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}$$

$$-\frac{\mathrm{I}b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)\sqrt{-c^{2}x^{2}+1}\,cf}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}-\frac{b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)fc^{2}x}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}-\frac{b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)g}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}$$

$$+\frac{\mathrm{I}bc^{2}\sqrt{-d\left(c^{2}x^{2}-1\right)}\sqrt{-c^{2}x^{2}+1}\arccos(cx)\ln\left(\frac{\left(cx+\mathrm{I}\sqrt{-c^{2}x^{2}+1}\right)g+cf+\sqrt{c^{2}f^{2}-g^{2}}}{cf+\sqrt{c^{2}f^{2}-g^{2}}}\right)f}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)^{3/2}}$$

$$-\frac{\mathrm{I}b\sqrt{-d\left(c^{2}x^{2}-1\right)}\arccos(cx)\sqrt{-c^{2}x^{2}+1}\,xcg}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)(gx+f)}$$

$$-\frac{bc^{3}\sqrt{-d\left(c^{2}x^{2}-1\right)}\sqrt{-c^{2}x^{2}+1}\ln\left(\left(cx+\mathrm{I}\sqrt{-c^{2}x^{2}+1}\right)^{2}g+2cf\left(cx+\mathrm{I}\sqrt{-c^{2}x^{2}+1}\right)+g\right)f^{2}}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)^{2}}$$

$$+\frac{2bc^{3}\sqrt{-d\left(c^{2}x^{2}-1\right)}\sqrt{-c^{2}x^{2}+1}\ln\left(cx+\mathrm{I}\sqrt{-c^{2}x^{2}+1}\right)f^{2}}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)^{2}}$$

$$-\frac{bc^{2}\sqrt{-d\left(c^{2}x^{2}-1\right)}\sqrt{-c^{2}x^{2}+1}\operatorname{dilog}\left(\frac{-\left(cx+\mathrm{I}\sqrt{-c^{2}x^{2}+1}\right)g-cf+\sqrt{c^{2}f^{2}-g^{2}}}{-cf+\sqrt{c^{2}f^{2}-g^{2}}}\right)f}{d\left(c^{2}x^{2}-1\right)\left(c^{2}f^{2}-g^{2}\right)^{3/2}}$$

$$+\frac{b c^{2} \sqrt{-d\left(c^{2} x^{2}-1\right)} \sqrt{-c^{2} x^{2}+1} \operatorname{dilog}\left(\frac{\left(c x+I \sqrt{-c^{2} x^{2}+1}\right) g+c f+\sqrt{c^{2} f^{2}-g^{2}}}{c f+\sqrt{c^{2} f^{2}-g^{2}}}\right) f}{d\left(c^{2} x^{2}-1\right)\left(c^{2} f^{2}-g^{2}\right)^{3 / 2}}$$

$$+\frac{b c \sqrt{-d\left(c^{2} x^{2}-1\right)} \sqrt{-c^{2} x^{2}+1} \ln \left(\left(c x+I \sqrt{-c^{2} x^{2}+1}\right)^{2} g+2 c f\left(c x+I \sqrt{-c^{2} x^{2}+1}\right)+g\right) g^{2}}{d\left(c^{2} x^{2}-1\right)\left(c^{2} f^{2}-g^{2}\right)^{2}}$$

$$-\frac{2 b c \sqrt{-d\left(c^{2} x^{2}-1\right)} \sqrt{-c^{2} x^{2}+1} \ln \left(c x+I \sqrt{-c^{2} x^{2}+1}\right) g^{2}}{d\left(c^{2} x^{2}-1\right)\left(c^{2} f^{2}-g^{2}\right)^{2}}$$

Problem 23: Unable to integrate problem.

$$\int \frac{\arccos\left(a x^{5}\right)}{x} \, dx$$

Optimal(type 4, 76 leaves, 5 steps):

$$-\frac{I \arccos\left(a x^{5}\right)^{2}}{10}+\frac{\arccos\left(a x^{5}\right) \ln \left(1+\left(a x^{5}+I \sqrt{-a^{2} x^{10}+1}\right)^{2}\right)}{5}-\frac{I \operatorname{polylog}\left(2,-\left(a x^{5}+I \sqrt{-a^{2} x^{10}+1}\right)^{2}\right)}{10}$$

Result(type 8, 12 leaves):

$$\int \frac{\arccos\left(a x^{5}\right)}{x} \, dx$$

Problem 24: Unable to integrate problem.

$$\int\left(a+b \arccos\left(d x^{2}-1\right)\right)^{4} dx$$

Optimal(type 3, 123 leaves, 3 steps):

$$384 b^{4} x-48 b^{2} x\left(a+b \arccos\left(d x^{2}-1\right)\right)^{2}+x\left(a+b \arccos\left(d x^{2}-1\right)\right)^{4}+\frac{192 b^{3}\left(a+b \arccos\left(d x^{2}-1\right)\right) \sqrt{-d^{2} x^{4}+2 d x^{2}}}{d x}$$

$$-\frac{8 b\left(a+b \arccos\left(d x^{2}-1\right)\right)^{3} \sqrt{-d^{2} x^{4}+2 d x^{2}}}{d x}$$

Result(type 8, 16 leaves):

$$\int\left(a+b \arccos\left(d x^{2}-1\right)\right)^{4} dx$$

Problem 25: Unable to integrate problem.

$$\int\left(a+b \arccos\left(d x^{2}-1\right)\right)^{3} dx$$

Optimal(type 3, 106 leaves, 5 steps):

$$-24 a b^2 x - 24 b^3 x \arccos(d x^2 - 1) + x (a + b \arccos(d x^2 - 1))^3 + \frac{48 b^3 \sqrt{-d^2 x^4 + 2 d x^2}}{d x} - \frac{6 b (a + b \arccos(d x^2 - 1))^2 \sqrt{-d^2 x^4 + 2 d x^2}}{d x}$$

Result(type 8, 16 leaves):

$$\int (a + b \arccos(d x^2 - 1))^3 \, dx$$

Problem 26: Unable to integrate problem.

$$\int \frac{1}{(a + b \arccos(d x^2 + 1))^{3/2}} \, dx$$

Optimal(type 4, 158 leaves, 1 step):

$$\frac{2 \left(\frac{1}{b}\right)^{3/2} \cos\left(\frac{a}{2 b}\right) \operatorname{FresnelS}\left(\frac{\sqrt{\frac{1}{b}} \sqrt{a + b \arccos(d x^2 + 1)}}{\sqrt{\pi}}\right) \sin\left(\frac{\arccos(d x^2 + 1)}{2}\right) \sqrt{\pi}}{d x}$$

$$- \frac{2 \left(\frac{1}{b}\right)^{3/2} \operatorname{FresnelC}\left(\frac{\sqrt{\frac{1}{b}} \sqrt{a + b \arccos(d x^2 + 1)}}{\sqrt{\pi}}\right) \sin\left(\frac{a}{2 b}\right) \sin\left(\frac{\arccos(d x^2 + 1)}{2}\right) \sqrt{\pi}}{d x} + \frac{\sqrt{-d^2 x^4 - 2 d x^2}}{b d x \sqrt{a + b \arccos(d x^2 + 1)}}$$

Result(type 8, 16 leaves):

$$\int \frac{1}{(a + b \arccos(d x^2 + 1))^{3/2}} \, dx$$

Problem 27: Unable to integrate problem.

$$\int \frac{1}{(a + b \arccos(d x^2 + 1))^{5/2}} \, dx$$

Optimal(type 4, 179 leaves, 2 steps):

$$\frac{2 \left(\frac{1}{b}\right)^{5/2} \cos\left(\frac{a}{2 b}\right) \operatorname{FresnelC}\left(\frac{\sqrt{\frac{1}{b}} \sqrt{a + b \arccos(d x^2 + 1)}}{\sqrt{\pi}}\right) \sin\left(\frac{\arccos(d x^2 + 1)}{2}\right) \sqrt{\pi}}{3 d x}$$

$$+ \frac{2 \left(\frac{1}{b}\right)^{5/2} \operatorname{FresnelS}\left(\frac{\sqrt{\frac{1}{b}} \sqrt{a + b \arccos(d x^2 + 1)}}{\sqrt{\pi}}\right) \sin\left(\frac{a}{2 b}\right) \sin\left(\frac{\arccos(d x^2 + 1)}{2}\right) \sqrt{\pi}}{3 d x} + \frac{\sqrt{-d^2 x^4 - 2 d x^2}}{3 b d x (a + b \arccos(d x^2 + 1))^{3/2}}$$

$$+\frac{x}{3 b^2 \sqrt{a+b \arccos(d x^2+1)}}$$

Result(type 8, 16 leaves):

$$\int \frac{1}{(a+b \arccos(d x^2+1))^{5/2}}\, dx$$

Problem 28: Unable to integrate problem.

$$\int \frac{1}{(a+b \arccos(d x^2-1))^{7/2}}\, dx$$

Optimal(type 4, 221 leaves, 2 steps):

$$\frac{x}{15 b^2 (a+b \arccos(d x^2-1))^{3/2}}+\frac{2 \left(\frac{1}{b}\right)^{7/2} \cos\left(\frac{a}{2 b}\right) \cos\left(\frac{\arccos(d x^2-1)}{2}\right) \operatorname{FresnelC}\left(\frac{\sqrt{\frac{1}{b}}\, \sqrt{a+b \arccos(d x^2-1)}}{\sqrt{\pi}}\right) \sqrt{\pi}}{15 d x}$$

$$+\frac{2 \left(\frac{1}{b}\right)^{7/2} \cos\left(\frac{\arccos(d x^2-1)}{2}\right) \operatorname{FresnelS}\left(\frac{\sqrt{\frac{1}{b}}\, \sqrt{a+b \arccos(d x^2-1)}}{\sqrt{\pi}}\right) \sin\left(\frac{a}{2 b}\right) \sqrt{\pi}}{15 d x}+\frac{\sqrt{-d^2 x^4+2 d x^2}}{5 b d x (a+b \arccos(d x^2-1))^{5/2}}$$

$$-\frac{\sqrt{-d^2 x^4+2 d x^2}}{15 b^3 d x \sqrt{a+b \arccos(d x^2-1)}}$$

Result(type 8, 16 leaves):

$$\int \frac{1}{(a+b \arccos(d x^2-1))^{7/2}}\, dx$$

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

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

Optimal(type 4, 308 leaves, 8 steps):

$$\frac{I \left(a+b \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)\right)^4}{4 b c}-\frac{\left(a+b \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)\right)^3 \ln\left(1+\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^2\right)}{c}$$

$$+\frac{3 I b \left(a+b \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)\right)^{2} \operatorname{polylog}\left(2, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{2 c}$$

$$-\frac{3 b^{2} \left(a+b \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)\right) \operatorname{polylog}\left(3, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{2 c}-\frac{3 I b^{3} \operatorname{polylog}\left(4, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{4 c}$$

Result(type 4, 706 leaves):

$$\frac{a^{3} \ln(c x+1)}{2 c}-\frac{a^{3} \ln(c x-1)}{2 c}+\frac{I b^{3} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)^{4}}{4 c}-\frac{b^{3} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)^{3} \ln\left(1+\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{c}$$

$$+\frac{3 I b^{3} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)^{2} \operatorname{polylog}\left(2, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{2 c}$$

$$-\frac{3 b^{3} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right) \operatorname{polylog}\left(3, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{2 c}-\frac{3 I b^{3} \operatorname{polylog}\left(4, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{4 c}$$

$$+\frac{I a b^{2} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)^{3}}{c}-\frac{3 a b^{2} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)^{2} \ln\left(1+\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{c}$$

$$+\frac{3 I a b^{2} \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right) \operatorname{polylog}\left(2, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{c}-\frac{3 a b^{2} \operatorname{polylog}\left(3, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{2 c}$$

$$+\frac{3 I a^{2} b \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right)^{2}}{2 c}-\frac{3 a^{2} b \arccos\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}\right) \ln\left(1+\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{c}$$

$$+\frac{3 I a^{2} b \operatorname{polylog}\left(2, -\left(\frac{\sqrt{-c x+1}}{\sqrt{c x+1}}+I \sqrt{1-\frac{-c x+1}{c x+1}}\right)^{2}\right)}{2 c}$$

Problem 31: Unable to integrate problem.

$$\int \frac{e^{\arccos(a x)}}{x^{2}}\, dx$$

Optimal(type 5, 95 leaves, 6 steps):

$$(1+I)\, a\, e^{(1+I) \arccos(a x)} \operatorname{hypergeom}\left(\left[1, \frac{1}{2}-\frac{I}{2}\right], \left[\frac{3}{2}-\frac{I}{2}\right], -\left(a x+I \sqrt{-a^2 x^2+1}\right)^2\right)-(2+2 I)\, a\, e^{(1+I) \arccos(a x)} \operatorname{hypergeom}\left(\left[2, \frac{1}{2}-\frac{I}{2}\right], \left[\frac{3}{2}-\frac{I}{2}\right], -\left(a x+I \sqrt{-a^2 x^2+1}\right)^2\right)$$

```
Result(type 8, 11 leaves):
```

$$\int \frac{e^{\arccos(a x)}}{x^2}\, dx$$

```
Problem 32: Unable to integrate problem.
```

$$\int \frac{\arccos\left(\sqrt{b x^2+1}\right)^n}{\sqrt{b x^2+1}}\, dx$$

```
Optimal(type 3, 35 leaves, 2 steps):
```

$$-\frac{\arccos\left(\sqrt{b x^2+1}\right)^{1+n} \sqrt{-b x^2}}{b\,(1+n)\, x}$$

```
Result(type 8, 24 leaves):
```

$$\int \frac{\arccos\left(\sqrt{b x^2+1}\right)^n}{\sqrt{b x^2+1}}\, dx$$

```
Problem 33: Unable to integrate problem.
```

$$\int \frac{1}{\arccos\left(\sqrt{b x^2+1}\right) \sqrt{b x^2+1}}\, dx$$

```
Optimal(type 3, 27 leaves, 2 steps):
```

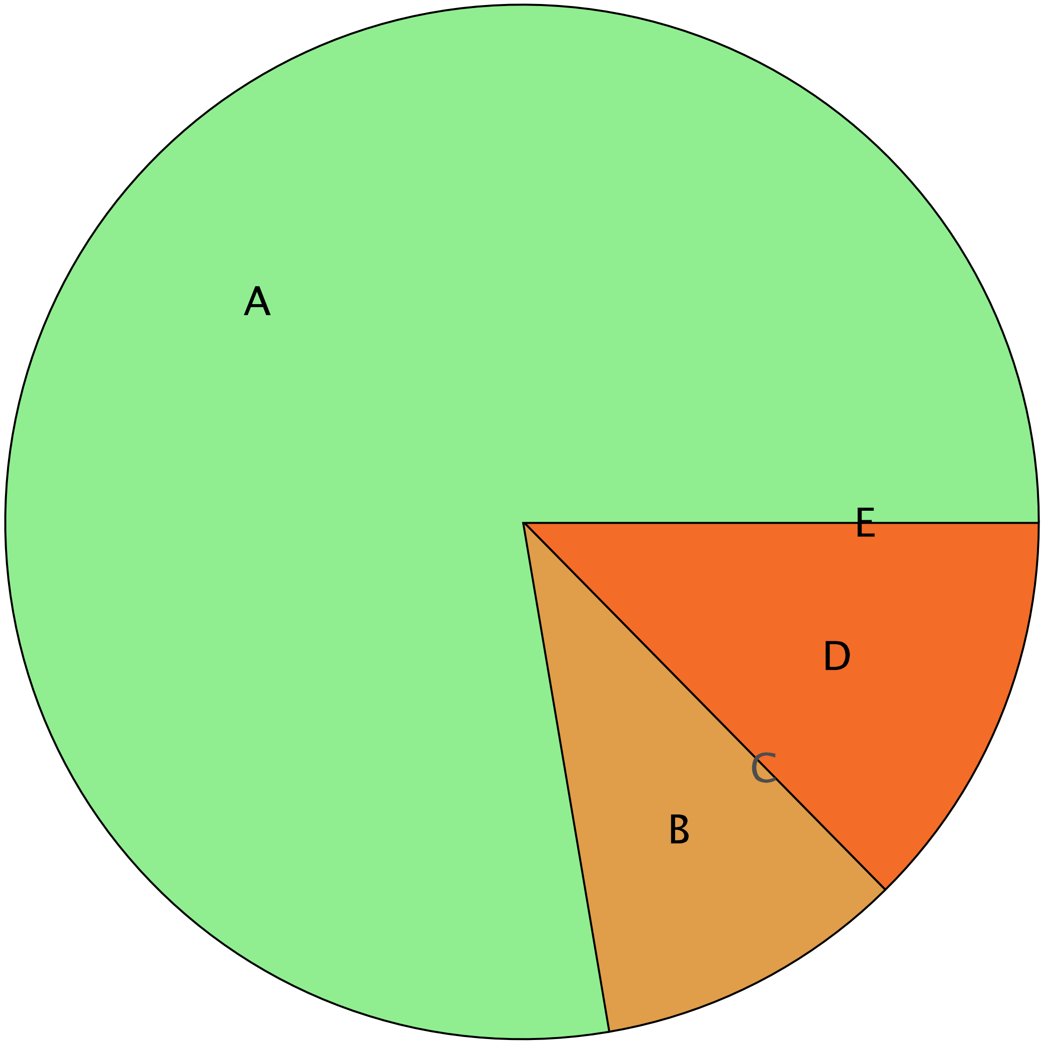
$$-\frac{\ln\left(\arccos\left(\sqrt{b x^2+1}\right)\right) \sqrt{-b x^2}}{b x}$$

```
Result(type 8, 24 leaves):
```

$$\int \frac{1}{\arccos\left(\sqrt{b x^2+1}\right) \sqrt{b x^2+1}}\, dx$$

Summary of Integration Test Results

103 integration problems



A - 80 optimal antiderivatives
B - 10 more than twice size of optimal antiderivatives
C - 0 unnecessarily complex antiderivatives
D - 13 unable to integrate problems
E - 0 integration timeouts