Maple 2018.2 Integration Test Results
on the problems in "4 Trig functions/4.4 Cotangent"

Test results for the 17 problems in "4.4.0 (a trg)^m (b cot)^n.txt"

Problem 10: Unable to integrate problem.

$$\int \cot(bx+a)^n\, dx$$

Optimal(type 5, 44 leaves, 2 steps):

$$-\frac{\cot(bx+a)^{1+n}\, \mathrm{hypergeom}\left(\left[1, \frac{1}{2}+\frac{n}{2}\right], \left[\frac{3}{2}+\frac{n}{2}\right], -\cot(bx+a)^2\right)}{b(1+n)}$$

Result(type 8, 10 leaves):

$$\int \cot(bx+a)^n\, dx$$

Problem 13: Unable to integrate problem.

$$\int (b\cot(fx+e))^n (a\sin(fx+e))^m\, dx$$

Optimal(type 5, 81 leaves, 2 steps):

$$-\frac{(b\cot(fx+e))^{1+n}\, \mathrm{hypergeom}\left(\left[\frac{1}{2}+\frac{n}{2}, \frac{1}{2}-\frac{m}{2}+\frac{n}{2}\right], \left[\frac{3}{2}+\frac{n}{2}\right], \cos(fx+e)^2\right) (a\sin(fx+e))^m \left(\sin(fx+e)^2\right)^{\frac{1}{2}-\frac{m}{2}+\frac{n}{2}}}{bf(1+n)}$$

Result(type 8, 23 leaves):

$$\int (b\cot(fx+e))^n (a\sin(fx+e))^m\, dx$$

Problem 14: Unable to integrate problem.

$$\int (a\cot(fx+e))^m (b\cot(fx+e))^n\, dx$$

Optimal(type 5, 66 leaves, 3 steps):

$$-\frac{(a\cot(fx+e))^{1+m} (b\cot(fx+e))^n\, \mathrm{hypergeom}\left(\left[1, \frac{1}{2}+\frac{m}{2}+\frac{n}{2}\right], \left[\frac{3}{2}+\frac{m}{2}+\frac{n}{2}\right], -\cot(fx+e)^2\right)}{af(1+m+n)}$$

Result(type 8, 23 leaves):

$$\int (a\cot(fx+e))^m (b\cot(fx+e))^n\, dx$$

Problem 16: Unable to integrate problem.

$$\int (d \cot(fx+e))^n \sin(fx+e)^4 \, dx$$

Optimal(type 5, 49 leaves, 2 steps):

$$-\frac{(d \cot(fx+e))^{1+n} \operatorname{hypergeom}\left(\left[3, \frac{1}{2}+\frac{n}{2}\right], \left[\frac{3}{2}+\frac{n}{2}\right], -\cot(fx+e)^2\right)}{d f (1+n)}$$

Result(type 8, 21 leaves):

$$\int (d \cot(fx+e))^n \sin(fx+e)^4 \, dx$$

Problem 17: Unable to integrate problem.

$$\int (d \cot(fx+e))^n \csc(fx+e) \, dx$$

Optimal(type 5, 71 leaves, 1 step):

$$-\frac{(d \cot(fx+e))^{1+n} \csc(fx+e) \operatorname{hypergeom}\left(\left[1+\frac{n}{2}, \frac{1}{2}+\frac{n}{2}\right], \left[\frac{3}{2}+\frac{n}{2}\right], \cos(fx+e)^2\right) \left(\sin(fx+e)^2\right)^{1+\frac{n}{2}}}{d f (1+n)}$$

Result(type 8, 19 leaves):

$$\int (d \cot(fx+e))^n \csc(fx+e) \, dx$$

Test results for the 10 problems in "4.4.1.2 (d csc)^m (a+b cot)^n.txt"

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

$$\int \frac{\csc(x)^3}{I+\cot(x)} \, dx$$

Optimal(type 3, 11 leaves, 2 steps):

$$I \operatorname{arctanh}(\cos(x)) - \csc(x)$$

Result(type 3, 23 leaves):

$$-\frac{\tan\left(\frac{x}{2}\right)}{2} - I \ln\left(\tan\left(\frac{x}{2}\right)\right) - \frac{1}{2 \tan\left(\frac{x}{2}\right)}$$

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

$$\int \frac{\sin(x)^2}{a+b\cot(x)} \, dx$$

Optimal(type 3, 68 leaves, 7 steps):

$$\frac{a\left(a^2+3b^2\right)x}{2\left(a^2+b^2\right)^2}-\frac{b^3\ln(b\cos(x)+a\sin(x))}{\left(a^2+b^2\right)^2}-\frac{(b+a\cot(x))\sin(x)^2}{2\left(a^2+b^2\right)}$$

Result(type 3, 172 leaves):

$$-\frac{\tan(x)\,a^3}{2\left(a^2+b^2\right)^2\left(\tan(x)^2+1\right)}-\frac{\tan(x)\,a\,b^2}{2\left(a^2+b^2\right)^2\left(\tan(x)^2+1\right)}+\frac{a^2\,b}{2\left(a^2+b^2\right)^2\left(\tan(x)^2+1\right)}+\frac{b^3}{2\left(a^2+b^2\right)^2\left(\tan(x)^2+1\right)}+\frac{b^3\ln\left(\tan(x)^2+1\right)}{2\left(a^2+b^2\right)^2}+\frac{3\arctan(\tan(x))\,a\,b^2}{2\left(a^2+b^2\right)^2}+\frac{\arctan(\tan(x))\,a^3}{2\left(a^2+b^2\right)^2}-\frac{b^3\ln(a\tan(x)+b)}{\left(a^2+b^2\right)^2}$$

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

$$\int\frac{\sin(x)^4}{a+b\cot(x)}\,dx$$

Optimal(type 3, 114 leaves, 8 steps):

$$\frac{a\left(3a^4+10a^2b^2+15b^4\right)x}{8\left(a^2+b^2\right)^3}-\frac{b^5\ln(b\cos(x)+a\sin(x))}{\left(a^2+b^2\right)^3}-\frac{\left(4b^3+a\left(3a^2+7b^2\right)\cot(x)\right)\sin(x)^2}{8\left(a^2+b^2\right)^2}-\frac{(b+a\cot(x))\sin(x)^4}{4\left(a^2+b^2\right)}$$

Result(type 3, 406 leaves):

$$-\frac{7\tan(x)^3a^3b^2}{4\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}-\frac{9\tan(x)^3a\,b^4}{8\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}-\frac{5\tan(x)^3a^5}{8\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{\tan(x)^2a^4b}{2\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{3\tan(x)^2a^2b^3}{2\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{\tan(x)^2b^5}{\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}-\frac{3\tan(x)\,a^5}{8\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}-\frac{5\tan(x)\,a^3b^2}{4\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}-\frac{7\tan(x)\,a\,b^4}{8\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{a^4b}{4\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{a^2b^3}{\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{3b^5}{4\left(a^2+b^2\right)^3\left(\tan(x)^2+1\right)^2}+\frac{b^5\ln\left(\tan(x)^2+1\right)}{2\left(a^2+b^2\right)^3}+\frac{15\arctan(\tan(x))\,a\,b^4}{8\left(a^2+b^2\right)^3}+\frac{3\arctan(\tan(x))\,a^5}{8\left(a^2+b^2\right)^3}+\frac{5\arctan(\tan(x))\,a^3b^2}{4\left(a^2+b^2\right)^3}-\frac{b^5\ln(a\tan(x)+b)}{\left(a^2+b^2\right)^3}$$

Problem 7: Result more than twice size of optimal antiderivative.

$$\int\frac{\csc(x)^5}{a+b\cot(x)}\,dx$$

Optimal(type 3, 91 leaves, 9 steps):

$$\frac{a\,\operatorname{arctanh}(\cos(x))}{2b^2}+\frac{a\left(a^2+b^2\right)\operatorname{arctanh}(\cos(x))}{b^4}+\frac{\left(a^2+b^2\right)^{3/2}\operatorname{arctanh}\left(\frac{(b-a\cot(x))\sin(x)}{\sqrt{a^2+b^2}}\right)}{b^4}-\frac{\left(a^2+b^2\right)\csc(x)}{b^3}+\frac{a\cot(x)\csc(x)}{2b^2}-\frac{\csc(x)^3}{3b}$$

Result(type 3, 231 leaves):

$$-\frac{\tan\left(\frac{x}{2}\right)^{3}}{24\,b}-\frac{a\tan\left(\frac{x}{2}\right)^{2}}{8\,b^{2}}-\frac{a^{2}\tan\left(\frac{x}{2}\right)}{2\,b^{3}}-\frac{5\tan\left(\frac{x}{2}\right)}{8\,b}-\frac{1}{24\,b\tan\left(\frac{x}{2}\right)^{3}}-\frac{a^{2}}{2\,b^{3}\tan\left(\frac{x}{2}\right)}-\frac{5}{8\,b\tan\left(\frac{x}{2}\right)}+\frac{a}{8\,b^{2}\tan\left(\frac{x}{2}\right)^{2}}-\frac{a^{3}\ln\left(\tan\left(\frac{x}{2}\right)\right)}{b^{4}}$$

$$-\frac{3\,a\ln\left(\tan\left(\frac{x}{2}\right)\right)}{2\,b^{2}}+\frac{2\,\mathrm{arctanh}\left(\frac{2\tan\left(\frac{x}{2}\right)b-2\,a}{2\sqrt{a^{2}+b^{2}}}\right)a^{4}}{b^{4}\sqrt{a^{2}+b^{2}}}+\frac{4\,\mathrm{arctanh}\left(\frac{2\tan\left(\frac{x}{2}\right)b-2\,a}{2\sqrt{a^{2}+b^{2}}}\right)a^{2}}{b^{2}\sqrt{a^{2}+b^{2}}}+\frac{2\,\mathrm{arctanh}\left(\frac{2\tan\left(\frac{x}{2}\right)b-2\,a}{2\sqrt{a^{2}+b^{2}}}\right)}{\sqrt{a^{2}+b^{2}}}$$

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

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

Optimal(type 3, 49 leaves, 5 steps):

$$\frac{a\,\mathrm{arctanh}(\cos(x))}{b^{2}}-\frac{\csc(x)}{b}+\frac{\mathrm{arctanh}\left(\frac{(b-a\cot(x))\sin(x)}{\sqrt{a^{2}+b^{2}}}\right)\sqrt{a^{2}+b^{2}}}{b^{2}}$$

Result(type 3, 106 leaves):

$$-\frac{\tan\left(\frac{x}{2}\right)}{2\,b}-\frac{1}{2\,b\tan\left(\frac{x}{2}\right)}-\frac{a\ln\left(\tan\left(\frac{x}{2}\right)\right)}{b^{2}}+\frac{2\,\mathrm{arctanh}\left(\frac{2\tan\left(\frac{x}{2}\right)b-2\,a}{2\sqrt{a^{2}+b^{2}}}\right)a^{2}}{b^{2}\sqrt{a^{2}+b^{2}}}+\frac{2\,\mathrm{arctanh}\left(\frac{2\tan\left(\frac{x}{2}\right)b-2\,a}{2\sqrt{a^{2}+b^{2}}}\right)}{\sqrt{a^{2}+b^{2}}}$$

Test results for the 9 problems in "4.4.1.3 (d cos)^m (a+b cot)^n.txt"

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

$$\int \frac{\sec(x)^{3}}{I+\cot(x)}\,dx$$

Optimal(type 3, 16 leaves, 8 steps):

$$\frac{I\,\mathrm{arctanh}(\sin(x))}{2}+\sec(x)-\frac{I\sec(x)\tan(x)}{2}$$

Result(type 3, 83 leaves):

$$\frac{I}{2\left(\tan\left(\frac{x}{2}\right)+1\right)^{2}}+\frac{I\ln\left(\tan\left(\frac{x}{2}\right)+1\right)}{2}+\frac{1}{\tan\left(\frac{x}{2}\right)+1}-\frac{I}{2\left(\tan\left(\frac{x}{2}\right)+1\right)}-\frac{I\ln\left(\tan\left(\frac{x}{2}\right)-1\right)}{2}-\frac{I}{2\left(\tan\left(\frac{x}{2}\right)-1\right)^{2}}-\frac{1}{\tan\left(\frac{x}{2}\right)-1}$$

$$-\frac{I}{2\left(\tan\left(\frac{x}{2}\right)-1\right)}$$

Problem 7: Result more than twice size of optimal antiderivative.

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

Optimal(type 3, 71 leaves, 9 steps):

$$\frac{\operatorname{arctanh}(\sin(x))}{2a}+\frac{b^2\operatorname{arctanh}(\sin(x))}{a^3}-\frac{b\sec(x)}{a^2}+\frac{b\operatorname{arctanh}\left(\frac{\cos(x)\,a-\sin(x)\,b}{\sqrt{a^2+b^2}}\right)\sqrt{a^2+b^2}}{a^3}+\frac{\sec(x)\tan(x)}{2a}$$

Result(type 3, 171 leaves):

$$-\frac{1}{2a\left(\tan\left(\frac{x}{2}\right)+1\right)^2}+\frac{1}{2a\left(\tan\left(\frac{x}{2}\right)+1\right)}-\frac{b}{a^2\left(\tan\left(\frac{x}{2}\right)+1\right)}+\frac{\ln\left(\tan\left(\frac{x}{2}\right)+1\right)}{2a}+\frac{\ln\left(\tan\left(\frac{x}{2}\right)+1\right)b^2}{a^3}+\frac{1}{2a\left(\tan\left(\frac{x}{2}\right)-1\right)^2}$$
$$+\frac{1}{2a\left(\tan\left(\frac{x}{2}\right)-1\right)}+\frac{b}{a^2\left(\tan\left(\frac{x}{2}\right)-1\right)}-\frac{\ln\left(\tan\left(\frac{x}{2}\right)-1\right)}{2a}-\frac{\ln\left(\tan\left(\frac{x}{2}\right)-1\right)b^2}{a^3}-\frac{2b\sqrt{a^2+b^2}\operatorname{arctanh}\left(\frac{2\tan\left(\frac{x}{2}\right)b-2a}{2\sqrt{a^2+b^2}}\right)}{a^3}$$

Test results for the 19 problems in "4.4.10 (c+d x)^m (a+b cot)^n.txt"

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

$$\int x^3\cot(bx+a)\,dx$$

Optimal(type 4, 82 leaves, 6 steps):

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

Result(type 4, 239 leaves):

$$-\frac{Ix^4}{4}+\frac{\ln\left(e^{I(bx+a)}+1\right)x^3}{b}+\frac{\ln\left(1-e^{I(bx+a)}\right)x^3}{b}+\frac{\ln\left(1-e^{I(bx+a)}\right)a^3}{b^4}-\frac{3I\operatorname{polylog}\left(2,e^{I(bx+a)}\right)x^2}{b^2}-\frac{3I\operatorname{polylog}\left(2,-e^{I(bx+a)}\right)x^2}{b^2}-\frac{2Ia^3x}{b^3}$$
$$-\frac{a^3\ln\left(e^{I(bx+a)}-1\right)}{b^4}+\frac{2a^3\ln\left(e^{I(bx+a)}\right)}{b^4}-\frac{3Ia^4}{2b^4}+\frac{6I\operatorname{polylog}\left(4,-e^{I(bx+a)}\right)}{b^4}+\frac{6I\operatorname{polylog}\left(4,e^{I(bx+a)}\right)}{b^4}+\frac{6\operatorname{polylog}\left(3,-e^{I(bx+a)}\right)x}{b^3}$$
$$+\frac{6\operatorname{polylog}\left(3,e^{I(bx+a)}\right)x}{b^3}$$

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

$$\int x \cot(bx+a)\, dx$$

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

$$-\frac{I x^2}{2}+\frac{x \ln\left(1-e^{2 I (bx+a)}\right)}{b}-\frac{I \operatorname{polylog}\left(2, e^{2 I (bx+a)}\right)}{2 b^2}$$

Result(type 4, 149 leaves):

$$-\frac{I x^2}{2}-\frac{2 I a x}{b}-\frac{I a^2}{b^2}+\frac{\ln\left(1-e^{I (bx+a)}\right) x}{b}+\frac{a \ln\left(1-e^{I (bx+a)}\right)}{b^2}-\frac{I \operatorname{polylog}\left(2, e^{I (bx+a)}\right)}{b^2}+\frac{\ln\left(e^{I (bx+a)}+1\right) x}{b}-\frac{I \operatorname{polylog}\left(2, -e^{I (bx+a)}\right)}{b^2}$$
$$+\frac{2 a \ln\left(e^{I (bx+a)}\right)}{b^2}-\frac{a \ln\left(e^{I (bx+a)}-1\right)}{b^2}$$

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

$$\int x^2 \cot(bx+a)^2\, dx$$

Optimal(type 4, 66 leaves, 6 steps):

$$-\frac{I x^2}{b}-\frac{x^3}{3}-\frac{x^2 \cot(bx+a)}{b}+\frac{2 x \ln\left(1-e^{2 I (bx+a)}\right)}{b^2}-\frac{I \operatorname{polylog}\left(2, e^{2 I (bx+a)}\right)}{b^3}$$

Result(type 4, 182 leaves):

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

Problem 10: Result more than twice size of optimal antiderivative.

$$\int \frac{(dx+c)^2}{\left(a+I a \cot(fx+e)\right)^2}\, dx$$

Optimal(type 3, 166 leaves, 8 steps):

$$-\frac{I d^2 e^{2 I e+2 I f x}}{8 a^2 f^3}+\frac{I d^2 e^{4 I e+4 I f x}}{128 a^2 f^3}-\frac{d e^{2 I e+2 I f x} (dx+c)}{4 a^2 f^2}+\frac{d e^{4 I e+4 I f x} (dx+c)}{32 a^2 f^2}+\frac{I e^{2 I e+2 I f x} (dx+c)^2}{4 a^2 f}-\frac{I e^{4 I e+4 I f x} (dx+c)^2}{16 a^2 f}+\frac{(dx+c)^3}{12 a^2 d}$$

Result(type 3, 1042 leaves):

$$-\frac{1}{f^3 a^2}\Bigg(-I c d e f \sin(fx+e)^4+4 I c d f\left(\frac{(fx+e) \sin(fx+e)^4}{4}+\frac{\left(\sin(fx+e)^3+\frac{3 \sin(fx+e)}{2}\right) \cos(fx+e)}{16}-\frac{3 f x}{32}-\frac{3 e}{32}\right)+\frac{I c^2 f^2 \sin(fx+e)^4}{2}$$

$$+2 I d^2 \Bigg(\frac{(fx+e)^2 \sin(fx+e)^4}{4} - \frac{(fx+e) \left(-\frac{\left(\sin(fx+e)^3 + \frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4} + \frac{3fx}{8} + \frac{3e}{8} \right)}{2} + \frac{3(fx+e)^2}{32} - \frac{\sin(fx+e)^4}{32}$$

$$- \frac{3\sin(fx+e)^2}{32} \Bigg) + \frac{I d^2 e^2 \sin(fx+e)^4}{2} - 4 I d^2 e \left(\frac{(fx+e)\sin(fx+e)^4}{4} + \frac{\left(\sin(fx+e)^3 + \frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{16} - \frac{3fx}{32} - \frac{3e}{32} \right)$$

$$+ 2 d^2 \Bigg((fx+e)^2 \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right) - \frac{(fx+e)\cos(fx+e)^2}{8} + \frac{\cos(fx+e)\sin(fx+e)}{16} + \frac{7fx}{64} + \frac{7e}{64} - \frac{(fx+e)^3}{12}$$

$$- \frac{(fx+e)}{2} \left(-\frac{\left(\sin(fx+e)^3 + \frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4} + \frac{3fx}{8} + \frac{3e}{8} \right) - \frac{(fx+e)\sin(fx+e)^4}{8}$$

$$- \frac{\left(\sin(fx+e)^3 + \frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{32} \Bigg) + 4cdf \Bigg((fx+e) \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right) - \frac{(fx+e)^2}{16} + \frac{\sin(fx+e)^2}{16} - (fx$$

$$+ e) \left(-\frac{\left(\sin(fx+e)^3 + \frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4} + \frac{3fx}{8} + \frac{3e}{8} \right) - \frac{\sin(fx+e)^4}{16} \Bigg) - 4 d^2 e \Bigg((fx+e) \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right)$$

$$- \frac{(fx+e)^2}{16} + \frac{\sin(fx+e)^2}{16} - (fx+e) \left(-\frac{\left(\sin(fx+e)^3 + \frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4} + \frac{3fx}{8} + \frac{3e}{8} \right) - \frac{\sin(fx+e)^4}{16} \Bigg) + 2c^2 f^2 \Bigg($$

$$-\frac{\cos(fx+e)^3 \sin(fx+e)}{4} + \frac{\cos(fx+e)\sin(fx+e)}{8} + \frac{fx}{8} + \frac{e}{8} \Bigg) - 4cdef \left(-\frac{\cos(fx+e)^3 \sin(fx+e)}{4} + \frac{\cos(fx+e)\sin(fx+e)}{8} + \frac{fx}{8} + \frac{e}{8} \right)$$

$$+ 2 d^2 e^2 \left(-\frac{\cos(fx+e)^3 \sin(fx+e)}{4} + \frac{\cos(fx+e)\sin(fx+e)}{8} + \frac{fx}{8} + \frac{e}{8} \right) - d^2 \Bigg((fx+e)^2 \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right)$$

$$- \frac{(fx+e)\cos(fx+e)^2}{2} + \frac{\cos(fx+e)\sin(fx+e)}{4} + \frac{fx}{4} + \frac{e}{4} - \frac{(fx+e)^3}{3} \Bigg) - 2cdf \Bigg((fx+e) \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right)$$

$$- \frac{(fx+e)^2}{4} + \frac{\sin(fx+e)^2}{4} \Bigg) + 2 d^2 e \left((fx+e) \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right) - \frac{(fx+e)^2}{4} + \frac{\sin(fx+e)^2}{4} \right) - c^2 f^2 \Bigg($$

$$-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \Bigg) + 2cdef \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right) - d^2 e^2 \left(-\frac{\cos(fx+e)\sin(fx+e)}{2} + \frac{fx}{2} + \frac{e}{2} \right) \Bigg)$$

Problem 11: Result more than twice size of optimal antiderivative.

$$\int \frac{dx + c}{(a + I a \cot(fx+e))^3}\, dx$$

Optimal(type 3, 181 leaves, 11 steps):

$$\frac{11 I d x}{96 a^3 f}-\frac{d x^2}{16 a^3}+\frac{x(d x+c)}{8 a^3}+\frac{d}{36 f^2(a+I a \cot(f x+e))^3}-\frac{I(d x+c)}{6 f(a+I a \cot(f x+e))^3}+\frac{5 d}{96 a f^2(a+I a \cot(f x+e))^2}-\frac{I(d x+c)}{8 a f(a+I a \cot(f x+e))^2}+\frac{11 d}{96 f^2(a^3+I a^3 \cot(f x+e))}-\frac{I(d x+c)}{8 f(a^3+I a^3 \cot(f x+e))}$$

Result(type 3, 652 leaves):

$$\frac{1}{f^2 a^3}\Bigg(4 I d\left(\frac{(fx+e)\sin(fx+e)^4}{4}+\frac{\left(\sin(fx+e)^3+\frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{16}-\frac{fx}{24}-\frac{e}{24}-\frac{(fx+e)\sin(fx+e)^6}{6}-\frac{\left(\sin(fx+e)^5+\frac{5\sin(fx+e)^3}{4}+\frac{15\sin(fx+e)}{8}\right)\cos(fx+e)}{36}\right)+4 I c f\left(-\frac{\sin(fx+e)^2\cos(fx+e)^4}{6}-\frac{\cos(fx+e)^4}{12}\right)-4 I d e\left(-\frac{\sin(fx+e)^2\cos(fx+e)^4}{6}-\frac{\cos(fx+e)^4}{12}\right)-4 d\left((fx+e)\left(-\frac{\left(\sin(fx+e)^3+\frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4}+\frac{3fx}{8}+\frac{3e}{8}\right)-\frac{(fx+e)^2}{32}+\frac{\sin(fx+e)^4}{96}+\frac{\sin(fx+e)^2}{32}-(fx+e)\left(-\frac{\left(\sin(fx+e)^5+\frac{5\sin(fx+e)^3}{4}+\frac{15\sin(fx+e)}{8}\right)\cos(fx+e)}{6}+\frac{5fx}{16}+\frac{5e}{16}\right)-\frac{\sin(fx+e)^6}{36}\right)-4 c f\left(-\frac{\cos(fx+e)^3\sin(fx+e)^3}{6}-\frac{\cos(fx+e)^3\sin(fx+e)}{8}+\frac{\cos(fx+e)\sin(fx+e)}{16}+\frac{fx}{16}+\frac{e}{16}\right)+4 d e\left(-\frac{\cos(fx+e)^3\sin(fx+e)^3}{6}-\frac{\cos(fx+e)^3\sin(fx+e)}{8}+\frac{\cos(fx+e)\sin(fx+e)}{16}+\frac{fx}{16}+\frac{e}{16}\right)-3 I d\left(\frac{(fx+e)\sin(fx+e)^4}{4}+\frac{\left(\sin(fx+e)^3+\frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{16}-\frac{3fx}{32}-\frac{3e}{32}\right)-\frac{3 I c f\sin(fx+e)^4}{4}+\frac{3 I d e\sin(fx+e)^4}{4}+d\left((fx+e)\left(-\frac{\left(\sin(fx+e)^3+\frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4}+\frac{3fx}{8}+\frac{3e}{8}\right)-\frac{3(fx+e)^2}{16}+\frac{\sin(fx+e)^4}{16}+\frac{3\sin(fx+e)^2}{16}\right)+c f\left(-\frac{\left(\sin(fx+e)^3+\frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4}+\frac{3fx}{8}+\frac{3e}{8}\right)-d e\left(-\frac{\left(\sin(fx+e)^3+\frac{3\sin(fx+e)}{2}\right)\cos(fx+e)}{4}+\frac{3fx}{8}+\frac{3e}{8}\right)\Bigg)$$

Problem 12: Unable to integrate problem.

$$\int\frac{(d x+c)^m}{(a+I a\cot(f x+e))^2}\,dx$$

Optimal(type 4, 159 leaves, 4 steps):

$$\frac{(dx+c)^{1+m}}{4a^2 d(1+m)}+\frac{I\,2^{-2-m}e^{2I\left(e-\frac{cf}{d}\right)}(dx+c)^m\Gamma\left(1+m,\frac{-2If(dx+c)}{d}\right)}{a^2 f\left(\frac{-If(dx+c)}{d}\right)^m}-\frac{I\,4^{-2-m}e^{4I\left(e-\frac{cf}{d}\right)}(dx+c)^m\Gamma\left(1+m,\frac{-4If(dx+c)}{d}\right)}{a^2 f\left(\frac{-If(dx+c)}{d}\right)^m}$$

Result(type 8, 24 leaves):

$$\int\frac{(dx+c)^m}{(a+Ia\cot(fx+e))^2}\,dx$$

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

$$\int(dx+c)\,(a+b\cot(fx+e))\,dx$$

Optimal(type 4, 71 leaves, 6 steps):

$$\frac{a(dx+c)^2}{2d}-\frac{Ib(dx+c)^2}{2d}+\frac{b(dx+c)\ln\left(1-e^{2I(fx+e)}\right)}{f}-\frac{Ibd\,\mathrm{polylog}\left(2,e^{2I(fx+e)}\right)}{2f^2}$$

Result(type 4, 239 leaves):

$$-\frac{Ibd\,\mathrm{polylog}\left(2,-e^{I(fx+e)}\right)}{f^2}-\frac{Ibdx^2}{2}+\frac{adx^2}{2}+acx-\frac{2bc\ln\left(e^{I(fx+e)}\right)}{f}+\frac{bc\ln\left(e^{I(fx+e)}+1\right)}{f}+\frac{bc\ln\left(e^{I(fx+e)}-1\right)}{f}+Ibcx$$
$$-\frac{Ibd\,\mathrm{polylog}\left(2,e^{I(fx+e)}\right)}{f^2}-\frac{2Ibdex}{f}+\frac{bd\ln\left(1-e^{I(fx+e)}\right)x}{f}+\frac{bd\ln\left(1-e^{I(fx+e)}\right)e}{f^2}-\frac{Ibde^2}{f^2}+\frac{bd\ln\left(e^{I(fx+e)}+1\right)x}{f}+\frac{2bde\ln\left(e^{I(fx+e)}\right)}{f^2}$$
$$-\frac{bde\ln\left(e^{I(fx+e)}-1\right)}{f^2}$$

Problem 16: Result more than twice size of optimal antiderivative.

$$\int(dx+c)^3\,(a+b\cot(fx+e))^3\,dx$$

Optimal(type 4, 535 leaves, 28 steps):

$$\frac{3Ib^3d(dx+c)^2\mathrm{polylog}\left(2,e^{2I(fx+e)}\right)}{2f^2}+\frac{Ib^3(dx+c)^4}{4d}-\frac{b^3(dx+c)^3}{2f}+\frac{a^3(dx+c)^4}{4d}-\frac{3Ib^3d^3\mathrm{polylog}\left(2,e^{2I(fx+e)}\right)}{2f^4}-\frac{3ab^2(dx+c)^4}{4d}$$
$$-\frac{3Ib^3d^3\mathrm{polylog}\left(4,e^{2I(fx+e)}\right)}{4f^4}-\frac{3b^3d(dx+c)^2\cot(fx+e)}{2f^2}-\frac{3ab^2(dx+c)^3\cot(fx+e)}{f}-\frac{b^3(dx+c)^3\cot(fx+e)^2}{2f}$$
$$+\frac{3b^3d^2(dx+c)\ln\left(1-e^{2I(fx+e)}\right)}{f^3}+\frac{9ab^2d(dx+c)^2\ln\left(1-e^{2I(fx+e)}\right)}{f^2}+\frac{3a^2b(dx+c)^3\ln\left(1-e^{2I(fx+e)}\right)}{f}-\frac{b^3(dx+c)^3\ln\left(1-e^{2I(fx+e)}\right)}{f}$$
$$-\frac{9Ia^2bd(dx+c)^2\mathrm{polylog}\left(2,e^{2I(fx+e)}\right)}{2f^2}-\frac{3Ia^2b(dx+c)^4}{4d}-\frac{9Iab^2d^2(dx+c)\mathrm{polylog}\left(2,e^{2I(fx+e)}\right)}{f^3}-\frac{3Iab^2(dx+c)^3}{f}$$
$$+\frac{9ab^2d^3\mathrm{polylog}\left(3,e^{2I(fx+e)}\right)}{2f^4}+\frac{9a^2bd^2(dx+c)\mathrm{polylog}\left(3,e^{2I(fx+e)}\right)}{2f^3}-\frac{3b^3d^2(dx+c)\mathrm{polylog}\left(3,e^{2I(fx+e)}\right)}{2f^3}$$

$$+\frac{9 I a^2 b d^3 \operatorname{polylog}(4, e^{2 I (fx+e)})}{4 f^4} - \frac{3 I b^3 d (dx+c)^2}{2 f^2}$$

```
Result(type ?, 3112 leaves): Display of huge result suppressed!
```

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

$$\int (dx+c)\,(a+b\cot(fx+e))^3\,dx$$

```
Optimal(type 4, 248 leaves, 16 steps):
```

$$-3 a b^2 c x - \frac{b^3 d x}{2 f} - \frac{3 a b^2 d x^2}{2} + \frac{a^3 (dx+c)^2}{2 d} - \frac{3 I a^2 b (dx+c)^2}{2 d} + \frac{I b^3 (dx+c)^2}{2 d} - \frac{b^3 d \cot(fx+e)}{2 f^2} - \frac{3 a b^2 (dx+c) \cot(fx+e)}{f}$$
$$- \frac{b^3 (dx+c) \cot(fx+e)^2}{2 f} + \frac{3 a^2 b (dx+c) \ln(1 - e^{2 I (fx+e)})}{f} - \frac{b^3 (dx+c) \ln(1 - e^{2 I (fx+e)})}{f} + \frac{3 a b^2 d \ln(\sin(fx+e))}{f^2}$$
$$- \frac{3 I a^2 b d \operatorname{polylog}(2, e^{2 I (fx+e)})}{2 f^2} + \frac{I b^3 d \operatorname{polylog}(2, e^{2 I (fx+e)})}{2 f^2}$$

```
Result(type 4, 744 leaves):
```

$$-3 a b^2 c x - \frac{3 a b^2 d x^2}{2} + \frac{3 b^2 a d \ln(e^{I (fx+e)} - 1)}{f^2} - \frac{6 b a^2 c \ln(e^{I (fx+e)})}{f} + \frac{3 b a^2 c \ln(e^{I (fx+e)} + 1)}{f} + \frac{3 b a^2 c \ln(e^{I (fx+e)} - 1)}{f}$$
$$+ \frac{I b^3 d \operatorname{polylog}(2, e^{I (fx+e)})}{f^2} + \frac{I b^3 d \operatorname{polylog}(2, -e^{I (fx+e)})}{f^2} - \frac{2 b^3 d e \ln(e^{I (fx+e)})}{f^2} + \frac{b^3 d e \ln(e^{I (fx+e)} - 1)}{f^2} + \frac{I b^3 d e^2}{f^2} - \frac{6 b^2 a d \ln(e^{I (fx+e)})}{f^2}$$
$$+ \frac{3 b^2 a d \ln(e^{I (fx+e)} + 1)}{f^2} - \frac{b^3 \ln(1 - e^{I (fx+e)}) d e}{f^2} - \frac{b^3 \ln(e^{I (fx+e)} + 1) d x}{f} - \frac{b^3 \ln(1 - e^{I (fx+e)}) d x}{f} - \frac{3 I a^2 b d x^2}{2} - I c b^3 x + a^3 c x + \frac{a^3 d x^2}{2}$$
$$- \frac{6 I b a^2 d e x}{f} + \frac{2 b^3 c \ln(e^{I (fx+e)})}{f} - \frac{b^3 c \ln(e^{I (fx+e)} + 1)}{f} - \frac{b^3 c \ln(e^{I (fx+e)} - 1)}{f} + \frac{I b^3 d x^2}{2}$$
$$+ \frac{b^2 \left(-6 I a d f x e^{2 I (fx+e)} - 6 I a c f e^{2 I (fx+e)} + 2 b d f x e^{2 I (fx+e)} + 6 I a d f x - I b d e^{2 I (fx+e)} + 2 b c f e^{2 I (fx+e)} + 6 I a c f + I b d\right)}{f^2 \left(e^{2 I (fx+e)} - 1\right)^2}$$
$$+ \frac{6 b a^2 d e \ln(e^{I (fx+e)})}{f^2} - \frac{3 b a^2 d e \ln(e^{I (fx+e)} - 1)}{f^2} - \frac{3 I b a^2 d \operatorname{polylog}(2, e^{I (fx+e)})}{f^2} - \frac{3 I b a^2 d \operatorname{polylog}(2, -e^{I (fx+e)})}{f^2} - \frac{3 I b a^2 d e^2}{f^2} + \frac{2 I b^3 d e x}{f}$$
$$+ \frac{3 b \ln(1 - e^{I (fx+e)}) a^2 d e}{f^2} + \frac{3 b \ln(1 - e^{I (fx+e)}) a^2 d x}{f} + \frac{3 b \ln(e^{I (fx+e)} + 1) a^2 d x}{f} + 3 I c b a^2 x$$

```
Problem 19: Result more than twice size of optimal antiderivative.
```

$$\int \frac{dx+c}{(a+b\cot(fx+e))^2}\,dx$$

```
Optimal(type 4, 198 leaves, 5 steps):
```

$$-\frac{(dx+c)^2}{2(a^2+b^2)d}+\frac{(-2adfx-2acf+bd)^2}{4a(a-Ib)^2(Ib+a)df^2}+\frac{b(dx+c)}{(a^2+b^2)f(a+b\cot(fx+e))}+\frac{b(-2adfx-2acf+bd)\ln\left(1-\frac{(Ib+a)e^{2I(fx+e)}}{a-Ib}\right)}{(a^2+b^2)^2f^2}$$
$$+\frac{Iabd\,\mathrm{polylog}\left(2,\frac{(Ib+a)e^{2I(fx+e)}}{a-Ib}\right)}{(a^2+b^2)^2f^2}$$

```
Result(type 4, 989 leaves):
```

$$\frac{dx^2}{2(2Iab+a^2-b^2)}+\frac{cx}{2Iab+a^2-b^2}+\frac{2Ib^2(dx+c)}{(b+Ia)f(b-Ia)^2\left(b e^{2I(fx+e)}-Ia e^{2I(fx+e)}+b+Ia\right)}$$
$$-\frac{2Iba^2c\ln\left(a e^{2I(fx+e)}+Ib e^{2I(fx+e)}-a+Ib\right)}{(b+Ia)f(b-Ia)^2(Ib-a)(Ib+a)}+\frac{2Ibad\ln\left(1-\frac{(Ib+a)e^{2I(fx+e)}}{a-Ib}\right)e}{(b+Ia)f^2(b-Ia)^2(a-Ib)}-\frac{b^3d\ln\left(a e^{2I(fx+e)}+Ib e^{2I(fx+e)}-a+Ib\right)}{(b+Ia)f^2(b-Ia)^2(Ib-a)(Ib+a)}$$
$$+\frac{Ib^2d\ln\left(a e^{2I(fx+e)}+Ib e^{2I(fx+e)}-a+Ib\right)a}{(b+Ia)f^2(b-Ia)^2(Ib-a)(Ib+a)}+\frac{2Iba^2de\ln\left(a e^{2I(fx+e)}+Ib e^{2I(fx+e)}-a+Ib\right)}{(b+Ia)f^2(b-Ia)^2(Ib-a)(Ib+a)}$$
$$+\frac{2b^2ac\ln\left(a e^{2I(fx+e)}+Ib e^{2I(fx+e)}-a+Ib\right)}{(b+Ia)f(b-Ia)^2(Ib-a)(Ib+a)}-\frac{2Ib^2d\ln\left(e^{I(fx+e)}\right)}{(b+Ia)f^2(b-Ia)^2(Ib-a)}+\frac{4Ibac\ln\left(e^{I(fx+e)}\right)}{(b+Ia)f(b-Ia)^2(Ib-a)}$$
$$-\frac{2b^2ade\ln\left(a e^{2I(fx+e)}+Ib e^{2I(fx+e)}-a+Ib\right)}{(b+Ia)f^2(b-Ia)^2(Ib-a)(Ib+a)}+\frac{2Ibad\ln\left(1-\frac{(Ib+a)e^{2I(fx+e)}}{a-Ib}\right)x}{(b+Ia)f(b-Ia)^2(a-Ib)}-\frac{4Ibade\ln\left(e^{I(fx+e)}\right)}{(b+Ia)f^2(b-Ia)^2(Ib-a)}$$
$$+\frac{2badx^2}{(b+Ia)(b-Ia)^2(a-Ib)}+\frac{4badex}{(b+Ia)f(b-Ia)^2(a-Ib)}+\frac{2bade^2}{(b+Ia)f^2(b-Ia)^2(a-Ib)}+\frac{bad\,\mathrm{polylog}\left(2,\frac{(Ib+a)e^{2I(fx+e)}}{a-Ib}\right)}{(b+Ia)f^2(b-Ia)^2(a-Ib)}$$

```
Test results for the 30 problems in "4.4.2.1 (a+b cot)^m (c+d cot)^n.txt"

Problem 1: Unable to integrate problem.
```

$$\int(a+Ia\cot(dx+c))^n\,dx$$

```
Optimal(type 5, 42 leaves, 2 steps):
```

$$\frac{\frac{I}{2}(a+Ia\cot(dx+c))^n\,\mathrm{hypergeom}\left([1,n],[1+n],\frac{1}{2}+\frac{I\cot(dx+c)}{2}\right)}{dn}$$

```
Result(type 8, 16 leaves):
```

$$\int(a+Ia\cot(dx+c))^n\,dx$$

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

$$\int (e\cot(dx+c))^{3/2}(a+a\cot(dx+c))\,dx$$

Optimal(type 3, 77 leaves, 4 steps):

$$-\frac{2a(e\cot(dx+c))^{3/2}}{3d}-\frac{ae^{3/2}\arctan\left(\frac{\left(\sqrt{e}-\cot(dx+c)\sqrt{e}\right)\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{d}-\frac{2ae\sqrt{e\cot(dx+c)}}{d}$$

Result(type 3, 362 leaves):

$$-\frac{2a(e\cot(dx+c))^{3/2}}{3d}-\frac{2ae\sqrt{e\cot(dx+c)}}{d}+\frac{ae(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{4d}$$
$$+\frac{ae(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2d}-\frac{ae(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2d}$$
$$+\frac{ae^2\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{4d(e^2)^{1/4}}+\frac{ae^2\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2d(e^2)^{1/4}}$$
$$-\frac{ae^2\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2d(e^2)^{1/4}}$$

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

$$\int \frac{a+a\cot(dx+c)}{(e\cot(dx+c))^{5/2}}\,dx$$

Optimal(type 3, 82 leaves, 4 steps):

$$\frac{2a}{3de(e\cot(dx+c))^{3/2}}-\frac{a\arctan\left(\frac{\left(\sqrt{e}-\cot(dx+c)\sqrt{e}\right)\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{de^{5/2}}+\frac{2a}{de^2\sqrt{e\cot(dx+c)}}$$

Result(type 3, 373 leaves):

$$\frac{2a}{de^2\sqrt{e\cot(dx+c)}}+\frac{2a}{3de(e\cot(dx+c))^{3/2}}+\frac{a(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{4de^3}$$

$$+\frac{a\,(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2\,d\,e^3}-\frac{a\,(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2\,d\,e^3}$$

$$+\frac{a\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^2}}\right)}{4\,d\,e^2\,(e^2)^{1/4}}+\frac{a\sqrt{2}\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2\,d\,e^2\,(e^2)^{1/4}}$$

$$-\frac{a\sqrt{2}\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{2\,d\,e^2\,(e^2)^{1/4}}$$

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

$$\int (e\cot(dx+c))^{5/2}\,(a+a\cot(dx+c))^3\,dx$$

Optimal(type 3, 157 leaves, 7 steps):

$$\frac{4\,a^3\,e\,(e\cot(dx+c))^{3/2}}{3\,d}-\frac{4\,a^3\,(e\cot(dx+c))^{5/2}}{5\,d}-\frac{40\,a^3\,(e\cot(dx+c))^{7/2}}{63\,d\,e}-\frac{2\,(e\cot(dx+c))^{7/2}\,(a^3+a^3\cot(dx+c))}{9\,d\,e}$$

$$+\frac{2\,a^3\,e^{5/2}\arctan\left(\frac{\left(\sqrt{e}-\cot(dx+c)\,\sqrt{e}\right)\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{d}+\frac{4\,a^3\,e^2\sqrt{e\cot(dx+c)}}{d}$$

Result(type 3, 445 leaves):

$$-\frac{2\,a^3\,(e\cot(dx+c))^{9/2}}{9\,d\,e^2}-\frac{6\,a^3\,(e\cot(dx+c))^{7/2}}{7\,d\,e}-\frac{4\,a^3\,(e\cot(dx+c))^{5/2}}{5\,d}+\frac{4\,a^3\,e\,(e\cot(dx+c))^{3/2}}{3\,d}+\frac{4\,a^3\,e^2\sqrt{e\cot(dx+c)}}{d}$$

$$-\frac{a^3\,e^2\,(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^2}}\right)}{2\,d}-\frac{a^3\,e^2\,(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d}$$

$$+\frac{a^3\,e^2\,(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d}-\frac{a^3\,e^3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^2}}\right)}{2\,d\,(e^2)^{1/4}}$$

$$-\frac{a^3\,e^3\sqrt{2}\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d\,(e^2)^{1/4}}+\frac{a^3\,e^3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d\,(e^2)^{1/4}}$$

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

$$\int (e\cot(dx+c))^{3/2}(a+a\cot(dx+c))^3\,dx$$

Optimal(type 3, 135 leaves, 6 steps):

$$-\frac{4a^3(e\cot(dx+c))^{3/2}}{3d}-\frac{32a^3(e\cot(dx+c))^{5/2}}{35de}-\frac{2(e\cot(dx+c))^{5/2}(a^3+a^3\cot(dx+c))}{7de}$$
$$-\frac{2a^3e^{3/2}\operatorname{arctanh}\left(\frac{(\sqrt{e}+\cot(dx+c)\sqrt{e})\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{d}+\frac{4a^3e\sqrt{e\cot(dx+c)}}{d}$$

Result(type 3, 418 leaves):

$$-\frac{2a^3(e\cot(dx+c))^{7/2}}{7de^2}-\frac{6a^3(e\cot(dx+c))^{5/2}}{5de}-\frac{4a^3(e\cot(dx+c))^{3/2}}{3d}+\frac{4a^3e\sqrt{e\cot(dx+c)}}{d}$$
$$-\frac{a^3e(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d}-\frac{a^3e(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d}$$
$$+\frac{a^3e(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d}+\frac{a^3e^2\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d(e^2)^{1/4}}$$
$$+\frac{a^3e^2\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d(e^2)^{1/4}}-\frac{a^3e^2\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d(e^2)^{1/4}}$$

Problem 7: Result more than twice size of optimal antiderivative.

$$\int \sqrt{e\cot(dx+c)}\,(a+a\cot(dx+c))^3\,dx$$

Optimal(type 3, 117 leaves, 5 steps):

$$-\frac{8a^3(e\cot(dx+c))^{3/2}}{5de}-\frac{2(e\cot(dx+c))^{3/2}(a^3+a^3\cot(dx+c))}{5de}-\frac{2a^3\arctan\left(\frac{(\sqrt{e}-\cot(dx+c)\sqrt{e})\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}\sqrt{e}}{d}-\frac{4a^3\sqrt{e\cot(dx+c)}}{d}$$

Result(type 3, 390 leaves):

$$-\frac{2a^3(e\cot(dx+c))^{5/2}}{5de^2}-\frac{2a^3(e\cot(dx+c))^{3/2}}{de}-\frac{4a^3\sqrt{e\cot(dx+c)}}{d}$$
$$+\frac{a^3(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d}+\frac{a^3(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d}$$

$$-\frac{a^3 (e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d}+\frac{a^3 e\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d(e^2)^{1/4}}$$
$$+\frac{a^3 e\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d(e^2)^{1/4}}-\frac{a^3 e\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d(e^2)^{1/4}}$$

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

$$\int \frac{(a+a\cot(dx+c))^3}{\sqrt{e\cot(dx+c)}}\, dx$$

Optimal(type 3, 98 leaves, 4 steps):

$$\frac{2a^3\operatorname{arctanh}\left(\frac{(\sqrt{e}+\cot(dx+c)\sqrt{e})\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{d\sqrt{e}}-\frac{16a^3\sqrt{e\cot(dx+c)}}{3de}-\frac{2(a^3+a^3\cot(dx+c))\sqrt{e\cot(dx+c)}}{3de}$$

Result(type 3, 378 leaves):

$$-\frac{2a^3(e\cot(dx+c))^{3/2}}{3de^2}-\frac{6a^3\sqrt{e\cot(dx+c)}}{de}+\frac{a^3 (e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2de}$$
$$+\frac{a^3(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{de}-\frac{a^3(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{de}$$
$$-\frac{a^3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d(e^2)^{1/4}}-\frac{a^3\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d(e^2)^{1/4}}$$
$$+\frac{a^3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d(e^2)^{1/4}}$$

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

$$\int \frac{(a+a\cot(dx+c))^3}{(e\cot(dx+c))^{3/2}}\, dx$$

Optimal(type 3, 99 leaves, 4 steps):

$$\frac{2a^3\arctan\left(\frac{\left(\sqrt{e}-\cot(dx+c)\sqrt{e}\right)\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{d\,e^{3/2}}+\frac{2\left(a^3+a^3\cot(dx+c)\right)}{d\,e\sqrt{e\cot(dx+c)}}-\frac{4a^3\sqrt{e\cot(dx+c)}}{d\,e^2}$$

Result(type 3, 387 leaves):

$$-\frac{2a^3\sqrt{e\cot(dx+c)}}{d\,e^2}-\frac{a^3(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d\,e^2}-\frac{a^3(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d\,e^2}$$
$$+\frac{a^3(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d\,e^2}-\frac{a^3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2d\,e\,(e^2)^{1/4}}$$
$$-\frac{a^3\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d\,e\,(e^2)^{1/4}}+\frac{a^3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{d\,e\,(e^2)^{1/4}}+\frac{2a^3}{d\,e\sqrt{e\cot(dx+c)}}$$

Problem 10: Result more than twice size of optimal antiderivative.

$$\int\frac{(e\cot(dx+c))^{5/2}}{a+a\cot(dx+c)}\,dx$$

Optimal(type 3, 92 leaves, 7 steps):

$$\frac{e^{5/2}\arctan\left(\frac{\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)}{a\,d}-\frac{e^{5/2}\arctan\left(\frac{\left(\sqrt{e}-\cot(dx+c)\sqrt{e}\right)\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{2a\,d}-\frac{2e^2\sqrt{e\cot(dx+c)}}{a\,d}$$

Result(type 3, 393 leaves):

$$-\frac{2e^2\sqrt{e\cot(dx+c)}}{a\,d}+\frac{e^{5/2}\arctan\left(\frac{\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)}{a\,d}+\frac{e^2(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{8d\,a}$$
$$+\frac{e^2(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{4d\,a}-\frac{e^2(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{4d\,a}$$
$$+\frac{e^3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{8d\,a\,(e^2)^{1/4}}+\frac{e^3\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{4d\,a\,(e^2)^{1/4}}$$

$$-\frac{e^3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{4da(e^2)^{1/4}}$$

Problem 12: Result more than twice size of optimal antiderivative.

$$\int \frac{(e\cot(dx+c))^{5/2}}{(a+a\cot(dx+c))^3}\,dx$$

Optimal(type 3, 135 leaves, 8 steps):

$$-\frac{e^{5/2}\arctan\left(\frac{\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)}{8a^3d}+\frac{e^{5/2}\operatorname{arctanh}\left(\frac{(\sqrt{e}+\cot(dx+c)\sqrt{e})\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{4a^3d}-\frac{5e^2\sqrt{e\cot(dx+c)}}{8a^3d(1+\cot(dx+c))}+\frac{e^2\sqrt{e\cot(dx+c)}}{4ad(a+a\cot(dx+c))^2}$$

Result(type 3, 439 leaves):

$$-\frac{5e^3(e\cot(dx+c))^{3/2}}{8da^3(e\cot(dx+c)+e)^2}-\frac{3e^4\sqrt{e\cot(dx+c)}}{8da^3(e\cot(dx+c)+e)^2}-\frac{e^{5/2}\arctan\left(\frac{\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)}{8a^3d}$$
$$+\frac{e^2(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{16da^3}+\frac{e^2(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{8da^3}$$
$$-\frac{e^2(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{8da^3}-\frac{e^3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{16da^3(e^2)^{1/4}}$$
$$-\frac{e^3\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{8da^3(e^2)^{1/4}}+\frac{e^3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{8da^3(e^2)^{1/4}}$$

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

$$\int \frac{1}{(e\cot(dx+c))^{3/2}(a+a\cot(dx+c))^3}\,dx$$

Optimal(type 3, 156 leaves, 9 steps):

$$\frac{31\arctan\left(\frac{\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)}{8a^3de^{3/2}}+\frac{\operatorname{arctanh}\left(\frac{(\sqrt{e}+\cot(dx+c)\sqrt{e})\sqrt{2}}{2\sqrt{e\cot(dx+c)}}\right)\sqrt{2}}{4a^3de^{3/2}}+\frac{27}{8a^3de\sqrt{e\cot(dx+c)}}-\frac{9}{8a^3de(1+\cot(dx+c))\sqrt{e\cot(dx+c)}}$$

$$-\frac{1}{4 a d e (a+a\cot(d x+c))^2 \sqrt{e\cot(d x+c)}}$$

Result(type 3, 457 leaves):

$$\frac{11 (e\cot(d x+c))^{3/2}}{8 d a^3 e (e\cot(d x+c)+e)^2}+\frac{13\sqrt{e\cot(d x+c)}}{8 d a^3 (e\cot(d x+c)+e)^2}+\frac{31\arctan\left(\frac{\sqrt{e\cot(d x+c)}}{\sqrt{e}}\right)}{8 a^3 d e^{3/2}}+\frac{2}{a^3 d e\sqrt{e\cot(d x+c)}}$$
$$+\frac{(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(d x+c)+(e^2)^{1/4}\sqrt{e\cot(d x+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(d x+c)-(e^2)^{1/4}\sqrt{e\cot(d x+c)}\sqrt{2}+\sqrt{e^2}}\right)}{16 d a^3 e^2}+\frac{(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(d x+c)}}{(e^2)^{1/4}}+1\right)}{8 d a^3 e^2}$$
$$-\frac{(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(d x+c)}}{(e^2)^{1/4}}+1\right)}{8 d a^3 e^2}-\frac{\sqrt{2}\ln\left(\frac{e\cot(d x+c)-(e^2)^{1/4}\sqrt{e\cot(d x+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(d x+c)+(e^2)^{1/4}\sqrt{e\cot(d x+c)}\sqrt{2}+\sqrt{e^2}}\right)}{16 d a^3 e (e^2)^{1/4}}$$
$$-\frac{\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(d x+c)}}{(e^2)^{1/4}}+1\right)}{8 d a^3 e (e^2)^{1/4}}+\frac{\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(d x+c)}}{(e^2)^{1/4}}+1\right)}{8 d a^3 e (e^2)^{1/4}}$$

Problem 14: Result more than twice size of optimal antiderivative.

$$\int \cot(x)^2\sqrt{1+\cot(x)}\,dx$$

Optimal(type 3, 160 leaves, 12 steps):

$$-\frac{2(1+\cot(x))^{3/2}}{3}-\frac{\arctan\left(\frac{-2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2+2\sqrt{2}}}{2}+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2+2\sqrt{2}}}{2}$$
$$+\frac{\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\sqrt{2+2\sqrt{2}}\right)}{2\sqrt{2+2\sqrt{2}}}-\frac{\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\sqrt{2+2\sqrt{2}}\right)}{2\sqrt{2+2\sqrt{2}}}$$

Result(type 3, 355 leaves):

$$-\frac{2(1+\cot(x))^{3/2}}{3}+\frac{\sqrt{2+2\sqrt{2}}\sqrt{2}\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\sqrt{2+2\sqrt{2}}\right)}{4}+\frac{\sqrt{2}\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}$$

$$-\frac{\sqrt{2+2\sqrt{2}}\,\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4}-\frac{\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}$$

$$-\frac{\sqrt{2+2\sqrt{2}}\,\sqrt{2}\,\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4}+\frac{\sqrt{2}\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}$$

$$+\frac{\sqrt{2+2\sqrt{2}}\,\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4}-\frac{\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}$$

Problem 15: Result more than twice size of optimal antiderivative.

$$\int\frac{\cot(x)^2}{\sqrt{1+\cot(x)}}\,dx$$

Optimal(type 3, 152 leaves, 12 steps):

$$-2\sqrt{1+\cot(x)}-\frac{\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4\sqrt{1+\sqrt{2}}}+\frac{\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4\sqrt{1+\sqrt{2}}}$$

$$-\frac{\arctan\left(\frac{-2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{1+\sqrt{2}}}{2}+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{1+\sqrt{2}}}{2}$$

Result(type 3, 441 leaves):

$$-2\sqrt{1+\cot(x)}-\frac{\sqrt{2+2\sqrt{2}}\,\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4}+\frac{\sqrt{2+2\sqrt{2}}\,\sqrt{2}\,\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{8}$$

$$+\frac{\sqrt{2}\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{4\sqrt{-2+2\sqrt{2}}}-\frac{\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}$$

$$+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2}}{\sqrt{-2+2\sqrt{2}}}+\frac{\sqrt{2+2\sqrt{2}}\,\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{4}$$

$$-\frac{\sqrt{2+2\sqrt{2}}\,\sqrt{2}\,\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{8}+\frac{\sqrt{2}\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{4\sqrt{-2+2\sqrt{2}}}$$

$$-\frac{\left(2+2\sqrt{2}\right)\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2}}{\sqrt{-2+2\sqrt{2}}}$$

Problem 16: Result more than twice size of optimal antiderivative.

$$\int \frac{\cot(x)^2}{(1+\cot(x))^{3/2}}\,dx$$

Optimal(type 3, 97 leaves, 6 steps):

$$\frac{1}{\sqrt{1+\cot(x)}}+\frac{\arctan\left(\frac{4+\cot(x)\left(2-\sqrt{2}\right)-3\sqrt{2}}{2\sqrt{1+\cot(x)}\,\sqrt{-7+5\sqrt{2}}}\right)\sqrt{-2+2\sqrt{2}}}{4}+\frac{\operatorname{arctanh}\left(\frac{4+3\sqrt{2}+\cot(x)\left(2+\sqrt{2}\right)}{2\sqrt{1+\cot(x)}\,\sqrt{7+5\sqrt{2}}}\right)\sqrt{2+2\sqrt{2}}}{4}$$

Result(type 3, 248 leaves):

$$-\frac{\sqrt{2+2\sqrt{2}}\,\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{8}+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2}}{2\sqrt{-2+2\sqrt{2}}}$$

$$-\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}+\frac{\sqrt{2+2\sqrt{2}}\,\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\,\sqrt{2+2\sqrt{2}}\right)}{8}$$

$$+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2}}{2\sqrt{-2+2\sqrt{2}}}-\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}+\frac{1}{\sqrt{1+\cot(x)}}$$

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

$$\int \frac{\cot(x)^2}{(1+\cot(x))^{5/2}}\,dx$$

Optimal(type 3, 101 leaves, 8 steps):

$$\frac{1}{3\left(1+\cot(x)\right)^{3/2}}-\frac{1}{\sqrt{1+\cot(x)}}+\frac{\arctan\left(\frac{3+\cot(x)\left(1-\sqrt{2}\right)-2\sqrt{2}}{\sqrt{1+\cot(x)}\sqrt{-14+10\sqrt{2}}}\right)\sqrt{\sqrt{2}-1}}{4}+\frac{\operatorname{arctanh}\left(\frac{3+2\sqrt{2}+\cot(x)\left(1+\sqrt{2}\right)}{\sqrt{1+\cot(x)}\sqrt{14+10\sqrt{2}}}\right)\sqrt{1+\sqrt{2}}}{4}$$

Result(type 3, 264 leaves):

$$\frac{1}{3\left(1+\cot(x)\right)^{3/2}}-\frac{1}{\sqrt{1+\cot(x)}}-\frac{\sqrt{2+2\sqrt{2}}\sqrt{2}\ln\left(1+\cot(x)+\sqrt{2}-\sqrt{1+\cot(x)}\sqrt{2+2\sqrt{2}}\right)}{16}-\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}$$
$$+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}-\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2}}{4\sqrt{-2+2\sqrt{2}}}+\frac{\sqrt{2+2\sqrt{2}}\sqrt{2}\ln\left(1+\cot(x)+\sqrt{2}+\sqrt{1+\cot(x)}\sqrt{2+2\sqrt{2}}\right)}{16}$$
$$-\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)}{2\sqrt{-2+2\sqrt{2}}}+\frac{\arctan\left(\frac{2\sqrt{1+\cot(x)}+\sqrt{2+2\sqrt{2}}}{\sqrt{-2+2\sqrt{2}}}\right)\sqrt{2}}{4\sqrt{-2+2\sqrt{2}}}$$

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

$$\int\left(e\cot(dx+c)\right)^{3/2}\left(a+b\cot(dx+c)\right)^{2}\,dx$$

Optimal(type 3, 260 leaves, 13 steps):

$$-\frac{4ab\left(e\cot(dx+c)\right)^{3/2}}{3d}-\frac{2b^{2}\left(e\cot(dx+c)\right)^{5/2}}{5de}-\frac{\left(a^{2}+2ab-b^{2}\right)e^{3/2}\arctan\left(1-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2d}$$
$$+\frac{\left(a^{2}+2ab-b^{2}\right)e^{3/2}\arctan\left(1+\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2d}-\frac{\left(a^{2}-2ab-b^{2}\right)e^{3/2}\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}-\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4d}$$
$$+\frac{\left(a^{2}-2ab-b^{2}\right)e^{3/2}\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}+\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4d}-\frac{2\left(a^{2}-b^{2}\right)e\sqrt{e\cot(dx+c)}}{d}$$

Result(type 3, 580 leaves):

$$-\frac{2b^{2}\left(e\cot(dx+c)\right)^{5/2}}{5de}-\frac{4ab\left(e\cot(dx+c)\right)^{3/2}}{3d}-\frac{2ea^{2}\sqrt{e\cot(dx+c)}}{d}+\frac{2eb^{2}\sqrt{e\cot(dx+c)}}{d}$$

$$+\frac{e\left(e^{2}\right)^{1/4}\sqrt{2}\,\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\left(e^{2}\right)^{1/4}}+1\right)a^{2}}{2d}-\frac{e\left(e^{2}\right)^{1/4}\sqrt{2}\,\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\left(e^{2}\right)^{1/4}}+1\right)b^{2}}{2d}$$

$$-\frac{e\left(e^{2}\right)^{1/4}\sqrt{2}\,\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\left(e^{2}\right)^{1/4}}+1\right)a^{2}}{2d}+\frac{e\left(e^{2}\right)^{1/4}\sqrt{2}\,\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\left(e^{2}\right)^{1/4}}+1\right)b^{2}}{2d}$$

$$+\frac{e\left(e^{2}\right)^{1/4}\sqrt{2}\,\ln\left(\frac{e\cot(dx+c)+\left(e^{2}\right)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^{2}}}{e\cot(dx+c)-\left(e^{2}\right)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^{2}}}\right)a^{2}}{4d}$$

$$-\frac{e\left(e^{2}\right)^{1/4}\sqrt{2}\,\ln\left(\frac{e\cot(dx+c)+\left(e^{2}\right)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^{2}}}{e\cot(dx+c)-\left(e^{2}\right)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^{2}}}\right)b^{2}}{4d}$$

$$+\frac{e^{2}ab\sqrt{2}\,\ln\left(\frac{e\cot(dx+c)-\left(e^{2}\right)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^{2}}}{e\cot(dx+c)+\left(e^{2}\right)^{1/4}\sqrt{e\cot(dx+c)}\,\sqrt{2}+\sqrt{e^{2}}}\right)}{2d\left(e^{2}\right)^{1/4}}+\frac{e^{2}ab\sqrt{2}\,\arctan\left(\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\left(e^{2}\right)^{1/4}}+1\right)}{d\left(e^{2}\right)^{1/4}}$$

$$-\frac{e^{2}ab\sqrt{2}\,\arctan\left(-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\left(e^{2}\right)^{1/4}}+1\right)}{d\left(e^{2}\right)^{1/4}}$$

Problem 19: Result more than twice size of optimal antiderivative.

$$\int\frac{(a+b\cot(dx+c))^{2}}{(e\cot(dx+c))^{3/2}}\,dx$$

Optimal(type 3, 218 leaves, 11 steps):

$$-\frac{\left(a^{2}-2ab-b^{2}\right)\arctan\left(1-\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2de^{3/2}}+\frac{\left(a^{2}-2ab-b^{2}\right)\arctan\left(1+\frac{\sqrt{2}\,\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2de^{3/2}}$$

$$+\frac{\left(a^{2}+2ab-b^{2}\right)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}-\sqrt{2}\,\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4de^{3/2}}$$

$$-\frac{\left(a^{2}+2ab-b^{2}\right)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}+\sqrt{2}\,\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4de^{3/2}}+\frac{2a^{2}}{de\sqrt{e\cot(dx+c)}}$$

Result(type 3, 537 leaves):

$$-\frac{a b \left(e^2\right)^{1/4} \sqrt{2}\, \ln\left(\frac{e \cot(d x+c) + \left(e^2\right)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}{e \cot(d x+c) - \left(e^2\right)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}\right)}{2 e^2 d} - \frac{a b \left(e^2\right)^{1/4} \sqrt{2}\, \arctan\left(\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right)}{e^2 d}$$

$$+ \frac{a b \left(e^2\right)^{1/4} \sqrt{2}\, \arctan\left(-\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right)}{e^2 d} + \frac{\sqrt{2}\, \ln\left(\frac{e \cot(d x+c) - \left(e^2\right)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}{e \cot(d x+c) + \left(e^2\right)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}\right) a^2}{4 e d \left(e^2\right)^{1/4}}$$

$$- \frac{\sqrt{2}\, \ln\left(\frac{e \cot(d x+c) - \left(e^2\right)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}{e \cot(d x+c) + \left(e^2\right)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}\right) b^2}{4 e d \left(e^2\right)^{1/4}} + \frac{\sqrt{2}\, \arctan\left(\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right) a^2}{2 e d \left(e^2\right)^{1/4}}$$

$$- \frac{\sqrt{2}\, \arctan\left(\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right) b^2}{2 e d \left(e^2\right)^{1/4}} - \frac{\sqrt{2}\, \arctan\left(-\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right) a^2}{2 e d \left(e^2\right)^{1/4}} + \frac{\sqrt{2}\, \arctan\left(-\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right) b^2}{2 e d \left(e^2\right)^{1/4}}$$

$$+ \frac{2 a^2}{d e \sqrt{e \cot(d x+c)}}$$

Problem 20: Result more than twice size of optimal antiderivative.

$$\int \frac{(a + b \cot(d x+c))^3}{\sqrt{e \cot(d x+c)}}\, dx$$

Optimal(type 3, 258 leaves, 12 steps):

$$\frac{(a-b) \left(a^2+4 a b+b^2\right) \arctan\left(1 - \frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\sqrt{e}}\right) \sqrt{2}}{2 d \sqrt{e}} - \frac{(a-b) \left(a^2+4 a b+b^2\right) \arctan\left(1 + \frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\sqrt{e}}\right) \sqrt{2}}{2 d \sqrt{e}}$$

$$+ \frac{(a+b) \left(a^2-4 a b+b^2\right) \ln\left(\sqrt{e} + \cot(d x+c) \sqrt{e} - \sqrt{2}\, \sqrt{e \cot(d x+c)}\right) \sqrt{2}}{4 d \sqrt{e}}$$

$$- \frac{(a+b) \left(a^2-4 a b+b^2\right) \ln\left(\sqrt{e} + \cot(d x+c) \sqrt{e} + \sqrt{2}\, \sqrt{e \cot(d x+c)}\right) \sqrt{2}}{4 d \sqrt{e}} - \frac{16 a b^2 \sqrt{e \cot(d x+c)}}{3 d e}$$

$$- \frac{2 b^2 (a + b \cot(d x+c)) \sqrt{e \cot(d x+c)}}{3 d e}$$

Result(type 3, 724 leaves):

$$-\frac{2 b^3 (e \cot(d x+c))^{3/2}}{3 d e^2} - \frac{6 a b^2 \sqrt{e \cot(d x+c)}}{d e} - \frac{a^3 \left(e^2\right)^{1/4} \sqrt{2}\, \arctan\left(\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{\left(e^2\right)^{1/4}} + 1\right)}{2 d e}$$

$$+\frac{3\left(e^2\right)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)a\,b^2}{2\,d\,e}+\frac{a^3\left(e^2\right)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)}{2\,d\,e}$$

$$-\frac{3\left(e^2\right)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)a\,b^2}{2\,d\,e}-\frac{a^3\left(e^2\right)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{4\,d\,e}$$

$$+\frac{3\left(e^2\right)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)a\,b^2}{4\,d\,e}$$

$$-\frac{3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)a^2 b}{4\,d\left(e^2\right)^{1/4}}+\frac{\sqrt{2}\ln\left(\frac{e\cot(dx+c)-\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+\left(e^2\right)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)b^3}{4\,d\left(e^2\right)^{1/4}}$$

$$-\frac{3\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)a^2 b}{2\,d\left(e^2\right)^{1/4}}+\frac{\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)b^3}{2\,d\left(e^2\right)^{1/4}}+\frac{3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)a^2 b}{2\,d\left(e^2\right)^{1/4}}$$

$$-\frac{\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\left(e^2\right)^{1/4}}+1\right)b^3}{2\,d\left(e^2\right)^{1/4}}$$

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

$$\int\frac{\left(a+b\cot(dx+c)\right)^3}{\left(e\cot(dx+c)\right)^{3/2}}\,dx$$

```
Optimal(type 3, 262 leaves, 12 steps):
```

$$-\frac{(a+b)\left(a^2-4ab+b^2\right)\arctan\left(1-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2\,d\,e^{3/2}}+\frac{(a+b)\left(a^2-4ab+b^2\right)\arctan\left(1+\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2\,d\,e^{3/2}}$$

$$+\frac{(a-b)\left(a^2+4ab+b^2\right)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}-\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4\,d\,e^{3/2}}$$

$$-\frac{(a-b)\left(a^2+4ab+b^2\right)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}+\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4\,d\,e^{3/2}}+\frac{2a^2\left(a+b\cot(dx+c)\right)}{d\,e\sqrt{e\cot(dx+c)}}-\frac{2b\left(a^2+b^2\right)\sqrt{e\cot(dx+c)}}{d\,e^2}$$

```
Result(type 3, 741 leaves):
```

$$-\frac{2 b^3 \sqrt{e \cot(d x+c)}}{d e^2}-\frac{3 (e^2)^{1/4} \sqrt{2} \arctan\left(\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right) a^2 b}{2 d e^2}+\frac{(e^2)^{1/4} \sqrt{2} \arctan\left(\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right) b^3}{2 d e^2}$$

$$+\frac{3 (e^2)^{1/4} \sqrt{2} \arctan\left(-\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right) a^2 b}{2 d e^2}-\frac{(e^2)^{1/4} \sqrt{2} \arctan\left(-\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right) b^3}{2 d e^2}$$

$$-\frac{3 (e^2)^{1/4} \sqrt{2} \ln\left(\frac{e \cot(d x+c)+(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}{e \cot(d x+c)-(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}\right) a^2 b}{4 d e^2}$$

$$+\frac{(e^2)^{1/4} \sqrt{2} \ln\left(\frac{e \cot(d x+c)+(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}{e \cot(d x+c)-(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}\right) b^3}{4 d e^2}+\frac{a^3 \sqrt{2} \ln\left(\frac{e \cot(d x+c)-(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}{e \cot(d x+c)+(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}\right)}{4 d e (e^2)^{1/4}}$$

$$-\frac{3 \sqrt{2} \ln\left(\frac{e \cot(d x+c)-(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}{e \cot(d x+c)+(e^2)^{1/4} \sqrt{e \cot(d x+c)} \sqrt{2}+\sqrt{e^2}}\right) a b^2}{4 d e (e^2)^{1/4}}+\frac{a^3 \sqrt{2} \arctan\left(\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right)}{2 d e (e^2)^{1/4}}$$

$$-\frac{3 \sqrt{2} \arctan\left(\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right) a b^2}{2 d e (e^2)^{1/4}}-\frac{a^3 \sqrt{2} \arctan\left(-\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right)}{2 d e (e^2)^{1/4}}+\frac{3 \sqrt{2} \arctan\left(-\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}}+1\right) a b^2}{2 d e (e^2)^{1/4}}$$

$$+\frac{2 a^3}{d e \sqrt{e \cot(d x+c)}}$$

Problem 22: Result more than twice size of optimal antiderivative.

$$\int \frac{(a+b \cot(d x+c))^3}{(e \cot(d x+c))^{5/2}}\, dx$$

Optimal(type 3, 258 leaves, 12 steps):

$$\frac{2 a^2 (a+b \cot(d x+c))}{3 d e (e \cot(d x+c))^{3/2}}-\frac{(a-b) (a^2+4 a b+b^2) \arctan\left(1-\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{\sqrt{e}}\right) \sqrt{2}}{2 d e^{5/2}}$$

$$+\frac{(a-b) (a^2+4 a b+b^2) \arctan\left(1+\frac{\sqrt{2} \sqrt{e \cot(d x+c)}}{\sqrt{e}}\right) \sqrt{2}}{2 d e^{5/2}}$$

$$-\frac{(a+b)\,(a^2-4ab+b^2)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}-\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4de^{5/2}}$$

$$+\frac{(a+b)\,(a^2-4ab+b^2)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}+\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4de^{5/2}}+\frac{16a^2b}{3de^2\sqrt{e\cot(dx+c)}}$$

Result(type 3, 742 leaves):

$$\frac{2a^3}{3de\,(e\cot(dx+c))^{3/2}}+\frac{6a^2b}{de^2\sqrt{e\cot(dx+c)}}+\frac{(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^3}{2de^3}$$

$$-\frac{3\,(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)ab^2}{2de^3}-\frac{(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^3}{2de^3}$$

$$+\frac{3\,(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)ab^2}{2de^3}+\frac{(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)a^3}{4de^3}$$

$$-\frac{3\,(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)ab^2}{4de^3}$$

$$+\frac{3\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)a^2b}{4de^2\,(e^2)^{1/4}}-\frac{\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)b^3}{4de^2\,(e^2)^{1/4}}$$

$$+\frac{3\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^2b}{2de^2\,(e^2)^{1/4}}-\frac{\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)b^3}{2de^2\,(e^2)^{1/4}}-\frac{3\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^2b}{2de^2\,(e^2)^{1/4}}$$

$$+\frac{\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)b^3}{2de^2\,(e^2)^{1/4}}$$

Problem 24: Result more than twice size of optimal antiderivative.

$$\int\frac{1}{(e\cot(dx+c))^{3/2}\,(a+b\cot(dx+c))^2}\,dx$$

Optimal(type 3, 372 leaves, 16 steps):

$$\frac{b^{5/2}(7a^2+3b^2)\arctan\left(\frac{\sqrt{b}\sqrt{e\cot(dx+c)}}{\sqrt{a}\sqrt{e}}\right)}{a^{5/2}(a^2+b^2)^2 d e^{3/2}} - \frac{(a^2+2ab-b^2)\arctan\left(1-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2(a^2+b^2)^2 d e^{3/2}}$$
$$+\frac{(a^2+2ab-b^2)\arctan\left(1+\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2(a^2+b^2)^2 d e^{3/2}} + \frac{(a^2-2ab-b^2)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}-\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4(a^2+b^2)^2 d e^{3/2}}$$
$$-\frac{(a^2-2ab-b^2)\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}+\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4(a^2+b^2)^2 d e^{3/2}} + \frac{2a^2+3b^2}{a^2(a^2+b^2)de\sqrt{e\cot(dx+c)}}$$
$$-\frac{b^2}{a(a^2+b^2)de(a+b\cot(dx+c))\sqrt{e\cot(dx+c)}}$$

Result(type 3, 802 leaves):

$$\frac{b^3\sqrt{e\cot(dx+c)}}{de(a^2+b^2)^2(e\cot(dx+c)b+ae)} + \frac{b^5\sqrt{e\cot(dx+c)}}{dea^2(a^2+b^2)^2(e\cot(dx+c)b+ae)} + \frac{7b^3\arctan\left(\frac{\sqrt{e\cot(dx+c)}\,b}{\sqrt{aeb}}\right)}{de(a^2+b^2)^2\sqrt{aeb}} + \frac{3b^5\arctan\left(\frac{\sqrt{e\cot(dx+c)}\,b}{\sqrt{aeb}}\right)}{dea^2(a^2+b^2)^2\sqrt{aeb}}$$
$$+\frac{2}{dea^2\sqrt{e\cot(dx+c)}} + \frac{ab(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)}{2de^2(a^2+b^2)^2}$$
$$+\frac{ab(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{de^2(a^2+b^2)^2} - \frac{ab(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)}{de^2(a^2+b^2)^2}$$
$$+\frac{\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)a^2}{4de(a^2+b^2)^2(e^2)^{1/4}} - \frac{\sqrt{2}\ln\left(\frac{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)b^2}{4de(a^2+b^2)^2(e^2)^{1/4}}$$
$$+\frac{\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^2}{2de(a^2+b^2)^2(e^2)^{1/4}} - \frac{\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)b^2}{2de(a^2+b^2)^2(e^2)^{1/4}} - \frac{\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^2}{2de(a^2+b^2)^2(e^2)^{1/4}}$$
$$+\frac{\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)b^2}{2de(a^2+b^2)^2(e^2)^{1/4}}$$

Problem 25: Result more than twice size of optimal antiderivative.

$$\int \frac{(e\cot(dx+c))^{9/2}}{(a+b\cot(dx+c))^3}\,dx$$

Optimal(type 3, 454 leaves, 17 steps):

$$\frac{a^{5/2}(15a^4+46a^2b^2+63b^4)e^{9/2}\arctan\left(\frac{\sqrt{b}\sqrt{e\cot(dx+c)}}{\sqrt{a}\sqrt{e}}\right)}{4b^{7/2}(a^2+b^2)^3 d}+\frac{a^2e^2(e\cot(dx+c))^{5/2}}{2b(a^2+b^2)d(a+b\cot(dx+c))^2}+\frac{a^2(5a^2+13b^2)e^3(e\cot(dx+c))^{3/2}}{4b^2(a^2+b^2)^2d(a+b\cot(dx+c))}$$
$$+\frac{(a-b)(a^2+4ab+b^2)e^{9/2}\arctan\left(1-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2(a^2+b^2)^3d}-\frac{(a-b)(a^2+4ab+b^2)e^{9/2}\arctan\left(1+\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{\sqrt{e}}\right)\sqrt{2}}{2(a^2+b^2)^3d}$$
$$-\frac{(a+b)(a^2-4ab+b^2)e^{9/2}\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}-\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4(a^2+b^2)^3d}$$
$$+\frac{(a+b)(a^2-4ab+b^2)e^{9/2}\ln\left(\sqrt{e}+\cot(dx+c)\sqrt{e}+\sqrt{2}\sqrt{e\cot(dx+c)}\right)\sqrt{2}}{4(a^2+b^2)^3d}-\frac{(15a^4+31a^2b^2+8b^4)e^4\sqrt{e\cot(dx+c)}}{4b^3(a^2+b^2)^2d}$$

Result(type 3, 1253 leaves):

$$-\frac{2e^4\sqrt{e\cot(dx+c)}}{db^3}-\frac{9e^5a^7(e\cot(dx+c))^{3/2}}{4db^2(a^2+b^2)^3(e\cot(dx+c)b+ae)^2}-\frac{13e^5a^5(e\cot(dx+c))^{3/2}}{2d(a^2+b^2)^3(e\cot(dx+c)b+ae)^2}-\frac{17e^5a^3b^2(e\cot(dx+c))^{3/2}}{4d(a^2+b^2)^3(e\cot(dx+c)b+ae)^2}$$
$$-\frac{7e^6a^8\sqrt{e\cot(dx+c)}}{4db^3(a^2+b^2)^3(e\cot(dx+c)b+ae)^2}-\frac{11e^6a^6\sqrt{e\cot(dx+c)}}{2db(a^2+b^2)^3(e\cot(dx+c)b+ae)^2}-\frac{15e^6a^4b\sqrt{e\cot(dx+c)}}{4d(a^2+b^2)^3(e\cot(dx+c)b+ae)^2}$$
$$+\frac{15e^5a^7\arctan\left(\frac{\sqrt{e\cot(dx+c)}\,b}{\sqrt{aeb}}\right)}{4db^3(a^2+b^2)^3\sqrt{aeb}}+\frac{23e^5a^5\arctan\left(\frac{\sqrt{e\cot(dx+c)}\,b}{\sqrt{aeb}}\right)}{2db(a^2+b^2)^3\sqrt{aeb}}+\frac{63e^5a^3b\arctan\left(\frac{\sqrt{e\cot(dx+c)}\,b}{\sqrt{aeb}}\right)}{4d(a^2+b^2)^3\sqrt{aeb}}$$
$$-\frac{3e^4(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^2b}{2d(a^2+b^2)^3}+\frac{e^4(e^2)^{1/4}\sqrt{2}\arctan\left(\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)b^3}{2d(a^2+b^2)^3}$$
$$+\frac{3e^4(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)a^2b}{2d(a^2+b^2)^3}-\frac{e^4(e^2)^{1/4}\sqrt{2}\arctan\left(-\frac{\sqrt{2}\sqrt{e\cot(dx+c)}}{(e^2)^{1/4}}+1\right)b^3}{2d(a^2+b^2)^3}$$
$$-\frac{3e^4(e^2)^{1/4}\sqrt{2}\ln\left(\frac{e\cot(dx+c)+(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}{e\cot(dx+c)-(e^2)^{1/4}\sqrt{e\cot(dx+c)}\sqrt{2}+\sqrt{e^2}}\right)a^2b}{4d(a^2+b^2)^3}$$

$$+\frac{e^4 (e^2)^{1/4} \sqrt{2}\, \ln\left(\frac{e \cot(d x+c) + (e^2)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}{e \cot(d x+c) - (e^2)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}\right) b^3}{4 d (a^2+b^2)^3}$$

$$-\frac{e^5 \sqrt{2}\, \ln\left(\frac{e \cot(d x+c) - (e^2)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}{e \cot(d x+c) + (e^2)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}\right) a^3}{4 d (a^2+b^2)^3 (e^2)^{1/4}} + \frac{3 e^5 \sqrt{2}\, \ln\left(\frac{e \cot(d x+c) - (e^2)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}{e \cot(d x+c) + (e^2)^{1/4} \sqrt{e \cot(d x+c)}\, \sqrt{2} + \sqrt{e^2}}\right) a b^2}{4 d (a^2+b^2)^3 (e^2)^{1/4}}$$

$$-\frac{e^5 \sqrt{2}\, \arctan\left(\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}} + 1\right) a^3}{2 d (a^2+b^2)^3 (e^2)^{1/4}} + \frac{3 e^5 \sqrt{2}\, \arctan\left(\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}} + 1\right) a b^2}{2 d (a^2+b^2)^3 (e^2)^{1/4}} + \frac{e^5 \sqrt{2}\, \arctan\left(-\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}} + 1\right) a^3}{2 d (a^2+b^2)^3 (e^2)^{1/4}}$$

$$-\frac{3 e^5 \sqrt{2}\, \arctan\left(-\frac{\sqrt{2}\, \sqrt{e \cot(d x+c)}}{(e^2)^{1/4}} + 1\right) a b^2}{2 d (a^2+b^2)^3 (e^2)^{1/4}}$$

Problem 26: Result more than twice size of optimal antiderivative.

$$\int \frac{1 - I \cot(d x+c)}{\sqrt{a + b \cot(d x+c)}}\, dx$$

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

$$\frac{-2\, I \operatorname{arctanh}\left(\frac{\sqrt{a + b \cot(d x+c)}}{\sqrt{I b + a}}\right)}{d \sqrt{I b + a}}$$

Result(type 3, 1621 leaves):

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

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

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

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

$$+\frac{\ln\left(\sqrt{a+b\cot(dx+c)}\,\sqrt{2\sqrt{a^2+b^2}+2a}-b\cot(dx+c)-a-\sqrt{a^2+b^2}\right)ab}{2d\sqrt{2\sqrt{a^2+b^2}+2a}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)}$$

$$+\frac{\ln\left(\sqrt{a+b\cot(dx+c)}\,\sqrt{2\sqrt{a^2+b^2}+2a}-b\cot(dx+c)-a-\sqrt{a^2+b^2}\right)a^2b}{2d\sqrt{2\sqrt{a^2+b^2}+2a}\,\sqrt{a^2+b^2}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)}$$

$$+\frac{\ln\left(\sqrt{a+b\cot(dx+c)}\,\sqrt{2\sqrt{a^2+b^2}+2a}-b\cot(dx+c)-a-\sqrt{a^2+b^2}\right)b^3}{2d\sqrt{2\sqrt{a^2+b^2}+2a}\,\sqrt{a^2+b^2}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)}$$

$$+\frac{I\ln\left(\sqrt{a+b\cot(dx+c)}\,\sqrt{2\sqrt{a^2+b^2}+2a}-b\cot(dx+c)-a-\sqrt{a^2+b^2}\right)a^2}{d\sqrt{2\sqrt{a^2+b^2}+2a}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)}+\frac{\arctan\left(\frac{\sqrt{2\sqrt{a^2+b^2}+2a}-2\sqrt{a+b\cot(dx+c)}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)ab}{d\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)\sqrt{2\sqrt{a^2+b^2}-2a}}$$

$$+\frac{\arctan\left(\frac{\sqrt{2\sqrt{a^2+b^2}+2a}-2\sqrt{a+b\cot(dx+c)}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)a^2b}{d\sqrt{a^2+b^2}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)\sqrt{2\sqrt{a^2+b^2}-2a}}+\frac{\arctan\left(\frac{\sqrt{2\sqrt{a^2+b^2}+2a}-2\sqrt{a+b\cot(dx+c)}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)b^3}{d\sqrt{a^2+b^2}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)\sqrt{2\sqrt{a^2+b^2}-2a}}$$

$$+\frac{I\ln\left(\sqrt{a+b\cot(dx+c)}\,\sqrt{2\sqrt{a^2+b^2}+2a}-b\cot(dx+c)-a-\sqrt{a^2+b^2}\right)a^3}{d\sqrt{2\sqrt{a^2+b^2}+2a}\,\sqrt{a^2+b^2}\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)}+\frac{I\arctan\left(\frac{2\sqrt{a+b\cot(dx+c)}+\sqrt{2\sqrt{a^2+b^2}+2a}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)}{d\sqrt{2\sqrt{a^2+b^2}-2a}}$$

$$-\frac{\ln\left(b\cot(dx+c)+a+\sqrt{a+b\cot(dx+c)}\,\sqrt{2\sqrt{a^2+b^2}+2a}+\sqrt{a^2+b^2}\right)b}{2d\sqrt{2\sqrt{a^2+b^2}+2a}\,\sqrt{a^2+b^2}}-\frac{I\arctan\left(\frac{\sqrt{2\sqrt{a^2+b^2}+2a}-2\sqrt{a+b\cot(dx+c)}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)b^2}{d\left(\sqrt{a^2+b^2}\,a+a^2+b^2\right)\sqrt{2\sqrt{a^2+b^2}-2a}}$$

$$-\frac{I\arctan\left(\frac{2\sqrt{a+b\cot(dx+c)}+\sqrt{2\sqrt{a^2+b^2}+2a}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)a}{d\sqrt{a^2+b^2}\,\sqrt{2\sqrt{a^2+b^2}-2a}}-\frac{\arctan\left(\frac{2\sqrt{a+b\cot(dx+c)}+\sqrt{2\sqrt{a^2+b^2}+2a}}{\sqrt{2\sqrt{a^2+b^2}-2a}}\right)b}{d\sqrt{a^2+b^2}\,\sqrt{2\sqrt{a^2+b^2}-2a}}$$

Problem 27: Result more than twice size of optimal antiderivative.

$$\int\frac{A+B\cot(dx+c)}{a+b\cot(dx+c)}\,dx$$

Optimal(type 3, 59 leaves, 2 steps):

$$\frac{(A a + B b) x}{a^2 + b^2} - \frac{(A b - B a) \ln(b \cos(d x + c) + a \sin(d x + c))}{d (a^2 + b^2)}$$

Result(type 3, 186 leaves):

$$\frac{\ln(\cot(d x + c)^2 + 1) A b}{2 d (a^2 + b^2)} - \frac{\ln(\cot(d x + c)^2 + 1) B a}{2 d (a^2 + b^2)} - \frac{A \pi a}{2 d (a^2 + b^2)} - \frac{B \pi b}{2 d (a^2 + b^2)} + \frac{A \operatorname{arccot}(\cot(d x + c)) a}{d (a^2 + b^2)} + \frac{B \operatorname{arccot}(\cot(d x + c)) b}{d (a^2 + b^2)} - \frac{\ln(a + b \cot(d x + c)) A b}{d (a^2 + b^2)} + \frac{\ln(a + b \cot(d x + c)) B a}{d (a^2 + b^2)}$$

Problem 28: Result more than twice size of optimal antiderivative.

$$\int (b \cot(d x + c) - a) \sqrt{a + b \cot(d x + c)}\, dx$$

Optimal(type 3, 341 leaves, 13 steps):

$$-\frac{2 b \sqrt{a + b \cot(d x + c)}}{d} + \frac{b \operatorname{arctanh}\left(\frac{-\sqrt{2} \sqrt{a + b \cot(d x + c)} + \sqrt{a + \sqrt{a^2 + b^2}}}{\sqrt{a - \sqrt{a^2 + b^2}}}\right) \sqrt{a^2 + b^2} \sqrt{2}}{2 d \sqrt{a - \sqrt{a^2 + b^2}}}$$
$$- \frac{b \operatorname{arctanh}\left(\frac{\sqrt{2} \sqrt{a + b \cot(d x + c)} + \sqrt{a + \sqrt{a^2 + b^2}}}{\sqrt{a - \sqrt{a^2 + b^2}}}\right) \sqrt{a^2 + b^2} \sqrt{2}}{2 d \sqrt{a - \sqrt{a^2 + b^2}}}$$
$$- \frac{b \ln\left(a + b \cot(d x + c) + \sqrt{a^2 + b^2} - \sqrt{2} \sqrt{a + b \cot(d x + c)} \sqrt{a + \sqrt{a^2 + b^2}}\right) \sqrt{a^2 + b^2} \sqrt{2}}{4 d \sqrt{a + \sqrt{a^2 + b^2}}}$$
$$+ \frac{b \ln\left(a + b \cot(d x + c) + \sqrt{a^2 + b^2} + \sqrt{2} \sqrt{a + b \cot(d x + c)} \sqrt{a + \sqrt{a^2 + b^2}}\right) \sqrt{a^2 + b^2} \sqrt{2}}{4 d \sqrt{a + \sqrt{a^2 + b^2}}}$$

Result(type ?, 2284 leaves): Display of huge result suppressed!

Problem 29: Result more than twice size of optimal antiderivative.

$$\int \frac{A + B \cot(d x + c)}{\sqrt{a + b \cot(d x + c)}}\, dx$$

Optimal(type 3, 84 leaves, 7 steps):

$$\frac{(IA+B)\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\cot(dx+c)}}{\sqrt{a-Ib}}\right)}{d\sqrt{a-Ib}}-\frac{(IA-B)\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\cot(dx+c)}}{\sqrt{Ib+a}}\right)}{d\sqrt{Ib+a}}$$

Result(type ?, 3975 leaves): Display of huge result suppressed!

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

$$\int \frac{A+B\cot(dx+c)}{(a+b\cot(dx+c))^{3/2}}\,dx$$

Optimal(type 3, 118 leaves, 8 steps):

$$\frac{(IA+B)\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\cot(dx+c)}}{\sqrt{a-Ib}}\right)}{(a-Ib)^{3/2}d}-\frac{(IA-B)\,\mathrm{arctanh}\left(\frac{\sqrt{a+b\cot(dx+c)}}{\sqrt{Ib+a}}\right)}{(Ib+a)^{3/2}d}+\frac{2(Ab-Ba)}{(a^2+b^2)\,d\sqrt{a+b\cot(dx+c)}}$$

Result(type ?, 7950 leaves): Display of huge result suppressed!

Test results for the 20 problems in "4.4.7 (d trig)^m (a+b (c cot)^n)^p.txt"

Problem 1: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{A+C\cot(dx+c)^2}{\sqrt{b\tan(dx+c)}}\,dx$$

Optimal(type 3, 182 leaves, 15 steps):

$$-\frac{(A-C)\arctan\left(1-\frac{\sqrt{2}\sqrt{b\tan(dx+c)}}{\sqrt{b}}\right)\sqrt{2}}{2d\sqrt{b}}+\frac{(A-C)\arctan\left(1+\frac{\sqrt{2}\sqrt{b\tan(dx+c)}}{\sqrt{b}}\right)\sqrt{2}}{2d\sqrt{b}}$$
$$-\frac{(A-C)\ln\left(\sqrt{b}-\sqrt{2}\sqrt{b\tan(dx+c)}+\sqrt{b}\tan(dx+c)\right)\sqrt{2}}{4d\sqrt{b}}+\frac{(A-C)\ln\left(\sqrt{b}+\sqrt{2}\sqrt{b\tan(dx+c)}+\sqrt{b}\tan(dx+c)\right)\sqrt{2}}{4d\sqrt{b}}$$
$$-\frac{2bC}{3d(b\tan(dx+c))^{3/2}}$$

Result(type ?, 2493 leaves): Display of huge result suppressed!

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

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

Optimal(type 3, 136 leaves, 6 steps):

$$\frac{x}{(a-b)^3}+\frac{b\cot(dx+c)}{4a(a-b)d\left(a+b\cot(dx+c)^2\right)^2}+\frac{(7a-3b)b\cot(dx+c)}{8a^2(a-b)^2d\left(a+b\cot(dx+c)^2\right)}+\frac{\left(15a^2-10ab+3b^2\right)\arctan\left(\frac{\cot(dx+c)\sqrt{b}}{\sqrt{a}}\right)\sqrt{b}}{8a^{5/2}(a-b)^3d}$$

Result(type 3, 362 leaves):

$$\frac{7b^2\cot(dx+c)^3}{8d(a-b)^3\left(a+b\cot(dx+c)^2\right)^2}-\frac{5b^3\cot(dx+c)^3}{4d(a-b)^3\left(a+b\cot(dx+c)^2\right)^2a}+\frac{3b^4\cot(dx+c)^3}{8d(a-b)^3\left(a+b\cot(dx+c)^2\right)^2a^2}$$

$$+\frac{9ba\cot(dx+c)}{8d(a-b)^3\left(a+b\cot(dx+c)^2\right)^2}-\frac{7b^2\cot(dx+c)}{4d(a-b)^3\left(a+b\cot(dx+c)^2\right)^2}+\frac{5b^3\cot(dx+c)}{8d(a-b)^3\left(a+b\cot(dx+c)^2\right)^2a}+\frac{15b\arctan\left(\frac{\cot(dx+c)b}{\sqrt{ab}}\right)}{8d(a-b)^3\sqrt{ab}}$$

$$-\frac{5b^2\arctan\left(\frac{\cot(dx+c)b}{\sqrt{ab}}\right)}{4d(a-b)^3a\sqrt{ab}}+\frac{3b^3\arctan\left(\frac{\cot(dx+c)b}{\sqrt{ab}}\right)}{8d(a-b)^3a^2\sqrt{ab}}-\frac{\pi}{2d(a-b)^3}+\frac{\operatorname{arccot}(\cot(dx+c))}{d(a-b)^3}$$

Problem 10: Result more than twice size of optimal antiderivative.

$$\int\sqrt{a+b\cot(x)^2}\,dx$$

Optimal(type 3, 53 leaves, 6 steps):

$$-\arctan\left(\frac{\cot(x)\sqrt{a-b}}{\sqrt{a+b\cot(x)^2}}\right)\sqrt{a-b}-\operatorname{arctanh}\left(\frac{\cot(x)\sqrt{b}}{\sqrt{a+b\cot(x)^2}}\right)\sqrt{b}$$

Result(type 3, 136 leaves):

$$-\sqrt{b}\ln\left(\cot(x)\sqrt{b}+\sqrt{a+b\cot(x)^2}\right)+\frac{\sqrt{b^4(a-b)}\arctan\left(\frac{b^2(a-b)\cot(x)}{\sqrt{b^4(a-b)}\sqrt{a+b\cot(x)^2}}\right)}{b(a-b)}-\frac{a\sqrt{b^4(a-b)}\arctan\left(\frac{b^2(a-b)\cot(x)}{\sqrt{b^4(a-b)}\sqrt{a+b\cot(x)^2}}\right)}{b^2(a-b)}$$

Problem 11: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\left(a+b\cot(x)^2\right)^{3/2}\tan(x)\,dx$$

Optimal(type 3, 61 leaves, 8 steps):

$$a^{3/2}\operatorname{arctanh}\left(\frac{\sqrt{a+b\cot(x)^2}}{\sqrt{a}}\right)-(a-b)^{3/2}\operatorname{arctanh}\left(\frac{\sqrt{a+b\cot(x)^2}}{\sqrt{a-b}}\right)-b\sqrt{a+b\cot(x)^2}$$

Result(type ?, 2627 leaves): Display of huge result suppressed!

Problem 16: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\tan(x)}{\sqrt{a+b\cot(x)^2}}\,dx$$

Optimal(type 3, 48 leaves, 7 steps):

$$\frac{\operatorname{arctanh}\left(\frac{\sqrt{a+b\cot(x)^2}}{\sqrt{a}}\right)}{\sqrt{a}} - \frac{\operatorname{arctanh}\left(\frac{\sqrt{a+b\cot(x)^2}}{\sqrt{a-b}}\right)}{\sqrt{a-b}}$$

Result(type 4, 375 leaves):

$$-\frac{1}{\sqrt{\frac{2\sqrt{a}\sqrt{a-b}-2a+b}{b}}\sqrt{\frac{a\cos(x)^2-b\cos(x)^2-a}{\cos(x)^2-1}}\,(\cos(x)-1)}\left(2\sqrt{2}\sqrt{\frac{\cos(x)\sqrt{a-b}\sqrt{a}-\sqrt{a}\sqrt{a-b}-\cos(x)a+b\cos(x)+a}{b(\cos(x)+1)}}\right.$$
$$\sqrt{-\frac{2\left(\cos(x)\sqrt{a-b}\sqrt{a}-\sqrt{a}\sqrt{a-b}+\cos(x)a-b\cos(x)-a\right)}{b(\cos(x)+1)}}\left(-\operatorname{EllipticPi}\left(\frac{(\cos(x)-1)\sqrt{\frac{2\sqrt{a}\sqrt{a-b}-2a+b}{b}}}{\sin(x)},\right.\right.$$
$$\left.\frac{b}{2\sqrt{a}\sqrt{a-b}-2a+b},\frac{\sqrt{-\frac{2\sqrt{a}\sqrt{a-b}+2a-b}{b}}}{\sqrt{\frac{2\sqrt{a}\sqrt{a-b}-2a+b}{b}}}\right)+\operatorname{EllipticPi}\left(\frac{(\cos(x)-1)\sqrt{\frac{2\sqrt{a}\sqrt{a-b}-2a+b}{b}}}{\sin(x)},-\frac{b}{2\sqrt{a}\sqrt{a-b}-2a+b},\right.$$
$$\left.\left.\left.\frac{\sqrt{-\frac{2\sqrt{a}\sqrt{a-b}+2a-b}{b}}}{\sqrt{\frac{2\sqrt{a}\sqrt{a-b}-2a+b}{b}}}\right)\right)\sin(x)\right)$$

Problem 20: Result more than twice size of optimal antiderivative.

$$\int \frac{\cot(x)}{\left(a+b\cot(x)^4\right)^{5/2}}\,dx$$

Optimal(type 3, 105 leaves, 7 steps):

$$\frac{\operatorname{arctanh}\left(\frac{a-b\cot(x)^2}{\sqrt{a+b}\sqrt{a+b\cot(x)^4}}\right)}{2(a+b)^{5/2}}+\frac{-a-b\cot(x)^2}{6a(a+b)\left(a+b\cot(x)^4\right)^{3/2}}+\frac{-3a^2-b(5a+2b)\cot(x)^2}{6a^2(a+b)^2\sqrt{a+b\cot(x)^4}}$$

Result(type 3, 601 leaves):

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

$$-\frac{\sqrt{b\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)^2+2\sqrt{-ab}\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)}}{24(\sqrt{-ab}+b)a\sqrt{-ab}\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)^2}-\frac{\sqrt{b\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)^2+2\sqrt{-ab}\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)}}{24(\sqrt{-ab}+b)a^2\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)}$$

$$-\frac{\sqrt{b\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)^2-2\sqrt{-ab}\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)}}{24(\sqrt{-ab}-b)a\sqrt{-ab}\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)^2}+\frac{\sqrt{b\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)^2-2\sqrt{-ab}\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)}}{24(\sqrt{-ab}-b)a^2\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)}$$

$$+\frac{(2\sqrt{-ab}-b)\sqrt{b\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)^2-2\sqrt{-ab}\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)}}{8(\sqrt{-ab}-b)^2a^2\left(\cot(x)^2+\frac{\sqrt{-ab}}{b}\right)}$$

$$-\frac{(2\sqrt{-ab}+b)\sqrt{b\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)^2+2\sqrt{-ab}\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)}}{8(\sqrt{-ab}+b)^2a^2\left(\cot(x)^2-\frac{\sqrt{-ab}}{b}\right)}$$

Test results for the 11 problems in "4.4.9 trig^m (a+b cot^n+c cot^(2 n))^p.txt"

Problem 1: Humongous result has more than 20000 leaves.

$$\int \frac{\cot(ex+d)^5}{\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\,dx$$

Optimal(type 3, 484 leaves, 15 steps):

$$-\frac{b\,\mathrm{arctanh}\left(\frac{b+2c\cot(ex+d)}{2\sqrt{c}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{2c^{3/2}e}+\frac{b(-12ac+5b^2)\,\mathrm{arctanh}\left(\frac{b+2c\cot(ex+d)}{2\sqrt{c}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{16c^{7/2}e}$$

$$+\frac{\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}{ce}-\frac{\cot(ex+d)^2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}{3ce}$$

$$-\frac{(15b^2-16ac-10bc\cot(ex+d))\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}{24c^3e}$$

$$-\frac{\operatorname{arctanh}\left(\frac{\left(a-c+b\cot(ex+d)-\sqrt{a^2-2ac+b^2+c^2}\right)\sqrt{2}}{2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a-c-\sqrt{a^2-2ac+b^2+c^2}}}\right)\sqrt{a-c-\sqrt{a^2-2ac+b^2+c^2}}\sqrt{2}}{2e\sqrt{a^2-2ac+b^2+c^2}}$$
$$+\frac{\operatorname{arctanh}\left(\frac{\left(a-c+b\cot(ex+d)+\sqrt{a^2-2ac+b^2+c^2}\right)\sqrt{2}}{2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a-c+\sqrt{a^2-2ac+b^2+c^2}}}\right)\sqrt{a-c+\sqrt{a^2-2ac+b^2+c^2}}\sqrt{2}}{2e\sqrt{a^2-2ac+b^2+c^2}}$$

Result(type ?, 9581342 leaves): Display of huge result suppressed!

Problem 2: Humongous result has more than 20000 leaves.

$$\int \frac{\cot(ex+d)}{\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\,dx$$

Optimal(type 3, 261 leaves, 6 steps):

$$-\frac{\operatorname{arctanh}\left(\frac{\left(a-c+b\cot(ex+d)-\sqrt{a^2-2ac+b^2+c^2}\right)\sqrt{2}}{2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a-c-\sqrt{a^2-2ac+b^2+c^2}}}\right)\sqrt{a-c-\sqrt{a^2-2ac+b^2+c^2}}\sqrt{2}}{2e\sqrt{a^2-2ac+b^2+c^2}}$$
$$+\frac{\operatorname{arctanh}\left(\frac{\left(a-c+b\cot(ex+d)+\sqrt{a^2-2ac+b^2+c^2}\right)\sqrt{2}}{2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a-c+\sqrt{a^2-2ac+b^2+c^2}}}\right)\sqrt{a-c+\sqrt{a^2-2ac+b^2+c^2}}\sqrt{2}}{2e\sqrt{a^2-2ac+b^2+c^2}}$$

Result(type ?, 9338542 leaves): Display of huge result suppressed!

Problem 3: Humongous result has more than 20000 leaves.

$$\int \cot(ex+d)^3\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\,dx$$

Optimal(type 3, 668 leaves, 16 steps):

$$-\frac{b\left(-4ac+b^2\right)\operatorname{arctanh}\left(\frac{b+2c\cot(ex+d)}{2\sqrt{c}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{16c^{5/2}e}-\frac{\left(a+b\cot(ex+d)+c\cot(ex+d)^2\right)^{3/2}}{3ce}$$
$$+\frac{b\operatorname{arctanh}\left(\frac{b+2c\cot(ex+d)}{2\sqrt{c}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{2e\sqrt{c}}+\frac{\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}{e}$$
$$+\frac{b\left(b+2c\cot(ex+d)\right)\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}{8c^2e}$$

$$-\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{1/4}e}\left(\operatorname{arctanh}\left(\left(\left(b^2+b\cot(ex+d)\sqrt{a^2-2ac+b^2+c^2}+(a-c)\left(a-c+\sqrt{a^2-2ac+b^2+c^2}\right)\right)\sqrt{2}\right)\Big/\left(2\left(a^2-2ac+b^2+c^2\right)^{1/4}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a^2+b^2+c\left(c-\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c-\sqrt{a^2-2ac+b^2+c^2}\right)}\right)\right)\sqrt{a^2+b^2+c\left(c-\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c-\sqrt{a^2-2ac+b^2+c^2}\right)}\sqrt{2}\right)$$

$$+\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{1/4}e}\left(\arctan\left(\left(\left(b^2+(a-c)\left(a-c-\sqrt{a^2-2ac+b^2+c^2}\right)-b\cot(ex+d)\sqrt{a^2-2ac+b^2+c^2}\right)\sqrt{2}\right)\Big/\left(2\left(a^2-2ac+b^2+c^2\right)^{1/4}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a^2+b^2+c\left(c+\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c+\sqrt{a^2-2ac+b^2+c^2}\right)}\right)\right)\sqrt{a^2+b^2+c\left(c+\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c+\sqrt{a^2-2ac+b^2+c^2}\right)}\sqrt{2}\right)$$

Result(type ?, 17766957 leaves): Display of huge result suppressed!

Problem 4: Humongous result has more than 20000 leaves.

$$\int\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\tan(ex+d)^3\,dx$$

Optimal(type 3, 620 leaves, 21 steps):

$$-\frac{\left(-4ac+b^2\right)\operatorname{arctanh}\left(\frac{2a+b\cot(ex+d)}{2\sqrt{a}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{8a^{3/2}e}-\frac{\operatorname{arctanh}\left(\frac{2a+b\cot(ex+d)}{2\sqrt{a}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)\sqrt{a}}{e}$$

$$+\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{1/4}e}\left(\operatorname{arctanh}\left(\left(\left(b^2+b\cot(ex+d)\sqrt{a^2-2ac+b^2+c^2}+(a-c)\left(a-c+\sqrt{a^2-2ac+b^2+c^2}\right)\right)\sqrt{2}\right)\Big/\left(2\left(a^2-2ac+b^2+c^2\right)^{1/4}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a^2+b^2+c\left(c-\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c-\sqrt{a^2-2ac+b^2+c^2}\right)}\right)\right)\sqrt{a^2+b^2+c\left(c-\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c-\sqrt{a^2-2ac+b^2+c^2}\right)}\sqrt{2}\right)$$

$$-\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{1/4}e}\left(\arctan\left(\left(\left(b^2+(a-c)\left(a-c-\sqrt{a^2-2ac+b^2+c^2}\right)-b\cot(ex+d)\sqrt{a^2-2ac+b^2+c^2}\right)\sqrt{2}\right)\Big/\left(2\left(a^2-2ac+b^2+c^2\right)^{1/4}\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{a^2+b^2+c\left(c+\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c+\sqrt{a^2-2ac+b^2+c^2}\right)}\right)\right)\sqrt{a^2+b^2+c\left(c+\sqrt{a^2-2ac+b^2+c^2}\right)-a\left(2c+\sqrt{a^2-2ac+b^2+c^2}\right)}\sqrt{2}\right)$$

$$+\frac{(2a+b\cot(ex+d))\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\tan(ex+d)^2}{4ae}$$

Result(type ?, 2698877 leaves): Display of huge result suppressed!

Problem 5: Humongous result has more than 20000 leaves.

$$\int \frac{\tan(ex+d)}{\left(a+b\cot(ex+d)+c\cot(ex+d)^2\right)^{3/2}}\,dx$$

Optimal(type 3, 684 leaves, 13 steps):

$$\frac{\operatorname{arctanh}\left(\frac{2a+b\cot(ex+d)}{2\sqrt{a}\,\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{a^{3/2}e} - \frac{2\left(b^2-2ac+bc\cot(ex+d)\right)}{a\left(-4ac+b^2\right)e\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}$$

$$+\frac{2\left(a\left(b^2-2(a-c)c\right)+bc(a+c)\cot(ex+d)\right)}{\left(b^2+(a-c)^2\right)\left(-4ac+b^2\right)e\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}$$

$$-\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{3/2}e}\left(\operatorname{arctanh}\left(\left(\left(b^2-(a-c)\left(a-c-\sqrt{a^2-2ac+b^2+c^2}\right)-b\cot(ex+d)\left(2a-2c+\sqrt{a^2-2ac+b^2+c^2}\right)\right)\sqrt{2}\right)\Big/\left(2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\,\sqrt{2a-2c+\sqrt{a^2-2ac+b^2+c^2}}\,\sqrt{a^2-b^2-2ac+c^2-(a-c)\sqrt{a^2-2ac+b^2+c^2}}\right)\right)\sqrt{2a-2c+\sqrt{a^2-2ac+b^2+c^2}}\,\sqrt{a^2-b^2-2ac+c^2-(a-c)\sqrt{a^2-2ac+b^2+c^2}}\,\sqrt{2}\right)$$

$$+\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{3/2}e}\left(\operatorname{arctanh}\left(\left(\left(b^2-b\cot(ex+d)\left(2a-2c-\sqrt{a^2-2ac+b^2+c^2}\right)-(a-c)\left(a-c+\sqrt{a^2-2ac+b^2+c^2}\right)\right)\sqrt{2}\right)\Big/\left(2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\,\sqrt{2a-2c-\sqrt{a^2-2ac+b^2+c^2}}\,\sqrt{a^2-b^2-2ac+c^2+(a-c)\sqrt{a^2-2ac+b^2+c^2}}\right)\right)\sqrt{2a-2c-\sqrt{a^2-2ac+b^2+c^2}}\,\sqrt{a^2-b^2-2ac+c^2+(a-c)\sqrt{a^2-2ac+b^2+c^2}}\,\sqrt{2}\right)$$

Result(type ?, 21253698 leaves): Display of huge result suppressed!

Problem 6: Attempted integration timed out after 120 seconds.

$$\int \frac{\tan(ex+d)^3}{\left(a+b\cot(ex+d)+c\cot(ex+d)^2\right)^{3/2}}\,dx$$

Optimal(type 3, 923 leaves, 18 steps):

$$-\frac{\operatorname{arctanh}\left(\frac{2a+b\cot(ex+d)}{2\sqrt{a}\,\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{a^{3/2}e} + \frac{3\left(-4ac+5b^2\right)\operatorname{arctanh}\left(\frac{2a+b\cot(ex+d)}{2\sqrt{a}\,\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}\right)}{8a^{7/2}e}$$

$$+\frac{2\left(b^2-2ac+bc\cot(ex+d)\right)}{a\left(-4ac+b^2\right)e\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}} - \frac{2\left(a\left(b^2-2(a-c)c\right)+bc(a+c)\cot(ex+d)\right)}{\left(b^2+(a-c)^2\right)\left(-4ac+b^2\right)e\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}$$

$$+\frac{1}{2\left(a^2-2ac+b^2+c^2\right)^{3/2}e}\left(\operatorname{arctanh}\left(\left(\left(b^2-(a-c)\left(a-c-\sqrt{a^2-2ac+b^2+c^2}\right)-b\cot(ex+d)\left(2a-2c\right.\right.\right.\right.\right.$$

$$+\sqrt{a^2-2ac+b^2+c^2}\Big)\Big)\sqrt{2}\Big)\Big/$$

$$\Big(2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{2a-2c+\sqrt{a^2-2ac+b^2+c^2}}\sqrt{a^2-b^2-2ac+c^2-(a-c)\sqrt{a^2-2ac+b^2+c^2}}\Big)\Big)$$

$$\sqrt{2a-2c+\sqrt{a^2-2ac+b^2+c^2}}\sqrt{a^2-b^2-2ac+c^2-(a-c)\sqrt{a^2-2ac+b^2+c^2}}\sqrt{2}\Big)$$

$$-\frac{1}{2(a^2-2ac+b^2+c^2)^{3/2}e}\Big(\operatorname{arctanh}\Big(\Big(\Big(b^2-b\cot(ex+d)\Big(2a-2c-\sqrt{a^2-2ac+b^2+c^2}\Big)-(a-c)\Big(a-c$$

$$+\sqrt{a^2-2ac+b^2+c^2}\Big)\Big)\sqrt{2}\Big)\Big/$$

$$\Big(2\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\sqrt{2a-2c-\sqrt{a^2-2ac+b^2+c^2}}\sqrt{a^2-b^2-2ac+c^2+(a-c)\sqrt{a^2-2ac+b^2+c^2}}\Big)\Big)$$

$$\sqrt{2a-2c-\sqrt{a^2-2ac+b^2+c^2}}\sqrt{a^2-b^2-2ac+c^2+(a-c)\sqrt{a^2-2ac+b^2+c^2}}\sqrt{2}\Big)$$

$$-\frac{b(-52ac+15b^2)\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\tan(ex+d)}{4a^3(-4ac+b^2)e}-\frac{2(b^2-2ac+bc\cot(ex+d))\tan(ex+d)^2}{a(-4ac+b^2)e\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}}$$

$$+\frac{(-12ac+5b^2)\sqrt{a+b\cot(ex+d)+c\cot(ex+d)^2}\tan(ex+d)^2}{2a^2(-4ac+b^2)e}$$

Result(type 1, 1 leaves):???

Problem 10: Result more than twice size of optimal antiderivative.

$$\int\cot(ex+d)^3\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\,dx$$

Optimal(type 3, 185 leaves, 8 steps):

$$\frac{(b^2+4bc-4c(a+2c))\operatorname{arctanh}\left(\frac{b+2c\cot(ex+d)^2}{2\sqrt{c}\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}}\right)}{16c^{3/2}e}$$

$$-\frac{\operatorname{arctanh}\left(\frac{2a-b+(b-2c)\cot(ex+d)^2}{2\sqrt{a-b+c}\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}}\right)\sqrt{a-b+c}}{2e}-\frac{(b-4c+2c\cot(ex+d)^2)\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}}{8ce}$$

Result(type 3, 466 leaves):

$$-\frac{\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\cot(ex+d)^2}{4e}-\frac{\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\,b}{8ec}$$

$$-\frac{\ln\left(\frac{\frac{b}{2}+c\cot(ex+d)^2}{\sqrt{c}}+\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\right)a}{4e\sqrt{c}}+\frac{\ln\left(\frac{\frac{b}{2}+c\cot(ex+d)^2}{\sqrt{c}}+\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\right)b^2}{16ec^{3/2}}$$

$$+\frac{\sqrt{\left(\cot(ex+d)^2+1\right)^2 c+(b-2c)\left(\cot(ex+d)^2+1\right)+a-b+c}}{2e}$$

$$+\frac{\ln\left(\frac{\frac{b}{2}-c+c\left(\cot(ex+d)^2+1\right)}{\sqrt{c}}+\sqrt{\left(\cot(ex+d)^2+1\right)^2 c+(b-2c)\left(\cot(ex+d)^2+1\right)+a-b+c}\right)b}{4e\sqrt{c}}$$

$$-\frac{\ln\left(\frac{\frac{b}{2}-c+c\left(\cot(ex+d)^2+1\right)}{\sqrt{c}}+\sqrt{\left(\cot(ex+d)^2+1\right)^2 c+(b-2c)\left(\cot(ex+d)^2+1\right)+a-b+c}\right)\sqrt{c}}{2e}$$

$$-\frac{1}{2e}\Bigg(\sqrt{a-b+c}\,\ln\Bigg(\frac{1}{\cot(ex+d)^2+1}\Big(2a-2b+2c+(b-2c)\left(\cot(ex+d)^2+1\right)$$
$$+2\sqrt{a-b+c}\sqrt{\left(\cot(ex+d)^2+1\right)^2 c+(b-2c)\left(\cot(ex+d)^2+1\right)+a-b+c}\Big)\Bigg)\Bigg)$$

Problem 11: Result more than twice size of optimal antiderivative.

$$\int \frac{\cot(ex+d)^3}{\left(a+b\cot(ex+d)^2+c\cot(ex+d)^4\right)^{3/2}}\,dx$$

Optimal(type 3, 141 leaves, 6 steps):

$$-\frac{\operatorname{arctanh}\left(\frac{2a-b+(b-2c)\cot(ex+d)^2}{2\sqrt{a-b+c}\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}}\right)}{2(a-b+c)^{3/2}e}+\frac{a(b-2c)+(2a-b)c\cot(ex+d)^2}{(a-b+c)\left(-4ac+b^2\right)e\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}}$$

Result(type 3, 508 leaves):

$$-\frac{2c\cot(ex+d)^2}{e\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\left(4ac-b^2\right)}-\frac{b}{e\sqrt{a+b\cot(ex+d)^2+c\cot(ex+d)^4}\left(4ac-b^2\right)}$$

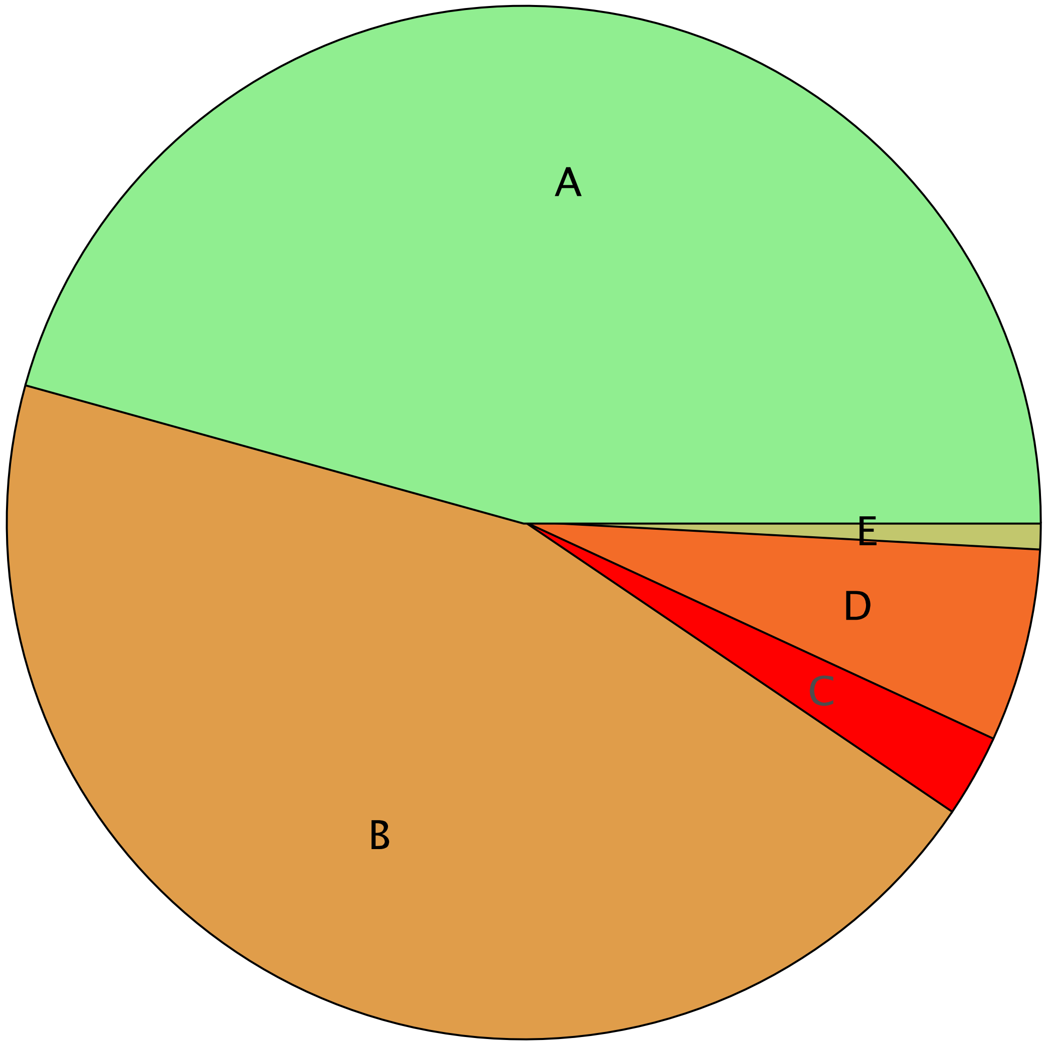
$$+\frac{2c\ln\left(\frac{2a-2b+2c+(b-2c)\left(\cot(ex+d)^2+1\right)+2\sqrt{a-b+c}\sqrt{\left(\cot(ex+d)^2+1\right)^2 c+(b-2c)\left(\cot(ex+d)^2+1\right)+a-b+c}}{\cot(ex+d)^2+1}\right)}{e\left(2c+\sqrt{-4ac+b^2}-b\right)\left(-2c+\sqrt{-4ac+b^2}+b\right)\sqrt{a-b+c}}$$

$$-\frac{2c\sqrt{\left(\cot(ex+d)^2-\frac{-b+\sqrt{-4ac+b^2}}{2c}\right)^2 c+\sqrt{-4ac+b^2}\left(\cot(ex+d)^2-\frac{-b+\sqrt{-4ac+b^2}}{2c}\right)}}{e\left(-4ac+b^2\right)\left(2c+\sqrt{-4ac+b^2}-b\right)\left(\cot(ex+d)^2+\frac{b}{2c}-\frac{\sqrt{-4ac+b^2}}{2c}\right)}$$

$$+\frac{2c\sqrt{\left(\cot(ex+d)^2+\frac{b+\sqrt{-4ac+b^2}}{2c}\right)^2 c-\sqrt{-4ac+b^2}\left(\cot(ex+d)^2+\frac{b+\sqrt{-4ac+b^2}}{2c}\right)}}{e\left(-4ac+b^2\right)\left(-2c+\sqrt{-4ac+b^2}+b\right)\left(\cot(ex+d)^2+\frac{b}{2c}+\frac{\sqrt{-4ac+b^2}}{2c}\right)}$$

Summary of Integration Test Results

116 integration problems



A - 53 optimal antiderivatives

B - 52 more than twice size of optimal antiderivatives
C - 3 unnecessarily complex antiderivatives
D - 7 unable to integrate problems
E - 1 integration timeouts