Mathematica 11.3 Integration Test Results

Test results for the 106 problems in "4.4.2.1 (a+b cot)^m (c+d cot)^n.m"

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

$$\int (a + i\, a \operatorname{Cot}[c + d x])^n \, dx$$

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

$$\frac{1}{2 d n} i \, (a + i\, a \operatorname{Cot}[c + d x])^n \, \text{Hypergeometric2F1}\left[1, n, 1 + n, \frac{1}{2} (1 + i \operatorname{Cot}[c + d x])\right]$$

Result (type 5, 112 leaves):

$$\frac{1}{4 d n (1 + n)} i \, (1 + i \operatorname{Cot}[c + d x])^{-n} (a + i\, a \operatorname{Cot}[c + d x])^n \left(2 (1 + n) \left(-1 + (1 + i \operatorname{Cot}[c + d x])^n\right) + n (1 + i \operatorname{Cot}[c + d x])^{1+n} \, \text{Hypergeometric2F1}\left[1, 1 + n, 2 + n, \frac{1}{2} (1 + i \operatorname{Cot}[c + d x])\right]\right)$$

Problem 41: Result unnecessarily involves imaginary or complex numbers.

$$\int \operatorname{Cot}[x]^2 \sqrt{1 + \operatorname{Cot}[x]} \, dx$$

Optimal (type 3, 223 leaves, 12 steps):

$$-\sqrt{\frac{1}{2}\left(1+\sqrt{2}\right)}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}-2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]+$$

$$\sqrt{\frac{1}{2}\left(1+\sqrt{2}\right)}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}+2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-$$

$$\frac{2}{3}\left(1+\text{Cot}[x]\right)^{3/2}+\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]-\sqrt{2\left(1+\sqrt{2}\right)}\ \sqrt{1+\text{Cot}[x]}\right]}{2\sqrt{2\left(1+\sqrt{2}\right)}}-$$

$$\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]+\sqrt{2\left(1+\sqrt{2}\right)}\ \sqrt{1+\text{Cot}[x]}\right]}{2\sqrt{2\left(1+\sqrt{2}\right)}}$$

Result (type 3, 69 leaves):

$$-i\sqrt{1-i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]+i\sqrt{1+i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]-\frac{2}{3}\left(1+\text{Cot}[x]\right)^{3/2}$$

Problem 42: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Cot}[x]\ \sqrt{1+\text{Cot}[x]}\ dx$$

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

$$\sqrt{\frac{1}{2}\left(-1+\sqrt{2}\right)}\ \text{ArcTan}\left[\frac{4-3\sqrt{2}+\left(2-\sqrt{2}\right)\text{Cot}[x]}{2\sqrt{-7+5\sqrt{2}}\ \sqrt{1+\text{Cot}[x]}}\right]+$$

$$\sqrt{\frac{1}{2}\left(1+\sqrt{2}\right)}\ \text{ArcTanh}\left[\frac{4+3\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cot}[x]}{2\sqrt{7+5\sqrt{2}}\ \sqrt{1+\text{Cot}[x]}}\right]-2\sqrt{1+\text{Cot}[x]}$$

Result (type 3, 61 leaves):

$$\sqrt{1-i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]+\sqrt{1+i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]-2\sqrt{1+\text{Cot}[x]}$$

Problem 43: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Cot}[x]^2\,(1+\text{Cot}[x])^{3/2}\,dx$$

Optimal (type 3, 139 leaves, 8 steps):

$$-\sqrt{-1+\sqrt{2}}\ \text{ArcTan}\left[\frac{3-2\sqrt{2}+\left(1-\sqrt{2}\right)\text{Cot}[x]}{\sqrt{2\left(-7+5\sqrt{2}\right)}\ \sqrt{1+\text{Cot}[x]}}\right]-\sqrt{1+\sqrt{2}}\ \text{ArcTanh}\left[\frac{3+2\sqrt{2}+\left(1+\sqrt{2}\right)\text{Cot}[x]}{\sqrt{2\left(7+5\sqrt{2}\right)}\ \sqrt{1+\text{Cot}[x]}}\right]+2\sqrt{1+\text{Cot}[x]}-\frac{2}{5}\left(1+\text{Cot}[x]\right)^{5/2}$$

Result (type 3, 96 leaves):

$$\left(\text{Sin}[x]\left(-2\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]}{\sqrt{1-i}}+\frac{\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]}{\sqrt{1+i}}\right)\left(1+\text{Cot}[x]\right)^2\text{Sin}[x]-\frac{2}{5}\left(1+\text{Cot}[x]\right)^{5/2}\left(-5+2\,\text{Cot}[x]+\text{Csc}[x]^2\right)\text{Sin}[x]\right)\right)\Big/\left(\text{Cos}[x]+\text{Sin}[x]\right)^2$$

Problem 44: Result unnecessarily involves imaginary or complex numbers.

$$\int \text{Cot}[x]\,(1+\text{Cot}[x])^{3/2}\,dx$$

Optimal (type 3, 221 leaves, 14 steps):

$$-\sqrt{1+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}-2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]+$$

$$\sqrt{1+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}+2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-2\sqrt{1+\text{Cot}[x]}-$$

$$\frac{2}{3}\left(1+\text{Cot}[x]\right)^{3/2}-\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]-\sqrt{2\left(1+\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}\right]}{2\sqrt{1+\sqrt{2}}}+$$

$$\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]+\sqrt{2\left(1+\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}\right]}{2\sqrt{1+\sqrt{2}}}$$

Result (type 3, 98 leaves):

$$\left(\text{Sin}[x]\left(\left(1+i\right)\left(-i\sqrt{1-i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]+\sqrt{1+i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]\right)\left(1+\text{Cot}[x]\right)^2\text{Sin}[x]-\frac{2}{3}\left(1+\text{Cot}[x]\right)^{3/2}\left(4+\text{Cot}[x]\right)\left(\text{Cos}[x]+\text{Sin}[x]\right)\right)\right)\Big/\left(\text{Cos}[x]+\text{Sin}[x]\right)^2$$

Problem 45: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cot}[x]^2}{\sqrt{1+\text{Cot}[x]}}\,dx$$

Optimal (type 3, 214 leaves, 12 steps):

$$-\frac{1}{2}\sqrt{1+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}-2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]+$$

$$\frac{1}{2}\sqrt{1+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}+2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-$$

$$2\sqrt{1+\text{Cot}[x]}-\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]-\sqrt{2\left(1+\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}\right]}{4\sqrt{1+\sqrt{2}}}+$$

$$\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]+\sqrt{2\left(1+\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}\right]}{4\sqrt{1+\sqrt{2}}}$$

Result (type 3, 67 leaves):

$$\frac{1}{2}(1-i)^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]+\frac{1}{2}(1+i)^{3/2}\,\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]-2\sqrt{1+\text{Cot}[x]}$$

Problem 46: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cot}[x]}{\sqrt{1+\text{Cot}[x]}}\,dx$$

Optimal (type 3, 121 leaves, 5 steps):

$$\frac{1}{2}\sqrt{-1+\sqrt{2}}\ \text{ArcTan}\left[\frac{3-2\sqrt{2}+\left(1-\sqrt{2}\right)\text{Cot}[x]}{\sqrt{2\left(-7+5\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}}\right]+$$

$$\frac{1}{2}\sqrt{1+\sqrt{2}}\ \text{ArcTanh}\left[\frac{3+2\sqrt{2}+\left(1+\sqrt{2}\right)\text{Cot}[x]}{\sqrt{2\left(7+5\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}}\right]$$

Result (type 3, 51 leaves):

$$\frac{\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]}{\sqrt{1-i}}+\frac{\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]}{\sqrt{1+i}}$$

Problem 47: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cot}[x]^2}{(1+\text{Cot}[x])^{3/2}}\,dx$$

Optimal (type 3, 139 leaves, 6 steps):

$$\frac{1}{2}\sqrt{\frac{1}{2}\left(-1+\sqrt{2}\right)}\ \text{ArcTan}\left[\frac{4-3\sqrt{2}+\left(2-\sqrt{2}\right)\text{Cot}[x]}{2\sqrt{-7+5\sqrt{2}}\ \sqrt{1+\text{Cot}[x]}}\right]+\frac{1}{2}\sqrt{\frac{1}{2}\left(1+\sqrt{2}\right)}\ \text{ArcTanh}\left[\frac{4+3\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cot}[x]}{2\sqrt{7+5\sqrt{2}}\ \sqrt{1+\text{Cot}[x]}}\right]+\frac{1}{\sqrt{1+\text{Cot}[x]}}$$

Result (type 3, 65 leaves):

$$\frac{1}{2}\sqrt{1-i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]+\frac{1}{2}\sqrt{1+i}\ \text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]+\frac{1}{\sqrt{1+\text{Cot}[x]}}$$

Problem 48: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Cot}[x]}{(1+\text{Cot}[x])^{3/2}}\,dx$$

Optimal (type 3, 226 leaves, 13 steps):

$$\frac{1}{2}\sqrt{\frac{1}{2}\left(1+\sqrt{2}\right)}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}-2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-\frac{1}{2}\sqrt{\frac{1}{2}\left(1+\sqrt{2}\right)}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}+2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-\frac{1}{\sqrt{1+\text{Cot}[x]}}-\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]-\sqrt{2\left(1+\sqrt{2}\right)}\ \sqrt{1+\text{Cot}[x]}\right]}{4\sqrt{2\left(1+\sqrt{2}\right)}}+\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]+\sqrt{2\left(1+\sqrt{2}\right)}\ \sqrt{1+\text{Cot}[x]}\right]}{4\sqrt{2\left(1+\sqrt{2}\right)}}$$

Result (type 3, 71 leaves):

$$\frac{1}{2}\,i\,\sqrt{1-i}\,\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]-\frac{1}{2}\,i\,\sqrt{1+i}\,\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]-\frac{1}{\sqrt{1+\text{Cot}[x]}}$$

Problem 49: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cot}[x]^2}{(1+\text{Cot}[x])^{5/2}}\,dx$$

Optimal (type 3, 143 leaves, 8 steps):

$$\frac{1}{4}\sqrt{-1+\sqrt{2}}\,\text{ArcTan}\left[\frac{3-2\sqrt{2}+\left(1-\sqrt{2}\right)\text{Cot}[x]}{\sqrt{2\left(-7+5\sqrt{2}\right)}\,\sqrt{1+\text{Cot}[x]}}\right]+$$

$$\frac{1}{4}\sqrt{1+\sqrt{2}}\,\text{ArcTanh}\left[\frac{3+2\sqrt{2}+\left(1+\sqrt{2}\right)\text{Cot}[x]}{\sqrt{2\left(7+5\sqrt{2}\right)}\,\sqrt{1+\text{Cot}[x]}}\right]+\frac{1}{3\,(1+\text{Cot}[x])^{3/2}}-\frac{1}{\sqrt{1+\text{Cot}[x]}}$$

Result (type 3, 75 leaves):

$$\frac{\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]}{2\sqrt{1-i}}+\frac{\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]}{2\sqrt{1+i}}+\frac{-2-3\,\text{Cot}[x]}{3\,(1+\text{Cot}[x])^{3/2}}$$

Problem 50: Result unnecessarily involves imaginary or complex numbers.

$$\int\frac{\text{Cot}[x]}{(1+\text{Cot}[x])^{5/2}}\,dx$$

Optimal (type 3, 216 leaves, 13 steps):

$$\frac{1}{4}\sqrt{1+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}-2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-$$

$$\frac{1}{4}\sqrt{1+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2\left(1+\sqrt{2}\right)}+2\sqrt{1+\text{Cot}[x]}}{\sqrt{2\left(-1+\sqrt{2}\right)}}\right]-$$

$$\frac{1}{3\left(1+\text{Cot}[x]\right)^{3/2}}+\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]-\sqrt{2\left(1+\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}\right]}{8\sqrt{1+\sqrt{2}}}-$$

$$\frac{\text{Log}\left[1+\sqrt{2}+\text{Cot}[x]+\sqrt{2\left(1+\sqrt{2}\right)}\sqrt{1+\text{Cot}[x]}\right]}{8\sqrt{1+\sqrt{2}}}$$

Result (type 3, 69 leaves):

$$-\frac{1}{4}\left(1-i\right)^{3/2}\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1-i}}\right]-\frac{1}{4}\left(1+i\right)^{3/2}\text{ArcTanh}\left[\frac{\sqrt{1+\text{Cot}[x]}}{\sqrt{1+i}}\right]-\frac{1}{3\left(1+\text{Cot}[x]\right)^{3/2}}$$

Problem 75: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 437 leaves, 16 steps):

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

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

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

$$\left(a^2+2ab-b^2\right)e^{7/2}\,\text{Log}\left[\sqrt{e}+\sqrt{e}\,\text{Cot}[c+d\,x]-\sqrt{2}\sqrt{e\,\text{Cot}[c+d\,x]}\right]-$$

$$\frac{1}{2\sqrt{2}\left(a^2+b^2\right)^2 d}\left(a^2+2ab-b^2\right)e^{7/2}\,\text{Log}\left[\sqrt{e}+\sqrt{e}\,\text{Cot}[c+d\,x]+\sqrt{2}\sqrt{e\,\text{Cot}[c+d\,x]}\right]$$

Result (type 3, 775 leaves):

$$\left(\left(e \operatorname{Cot}[c+d x]\right)^{7/2} \operatorname{Sec}[c+d x]^2 \left(b \operatorname{Cos}[c+d x]+a \operatorname{Sin}[c+d x]\right)^2 \left(-\frac{2}{b^2}-\frac{a^3 \operatorname{Sin}[c+d x]}{b^2 (-i a+b) (i a+b) \left(b \operatorname{Cos}[c+d x]+a \operatorname{Sin}[c+d x]\right)}\right) \operatorname{Tan}[c+d x]\right) \Big/ \left(d \left(a+b \operatorname{Cot}[c+d x]\right)^2\right) - \frac{1}{2 (a-i b) (a+i b) b^2 d \operatorname{Cot}[c+d x]^{7/2} \left(a+b \operatorname{Cot}[c+d x]\right)^2}$$

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

$$\left(-\left(\left(2 \left(3 a^3+3 a b^2\right) \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{\operatorname{Cot}[c+d x]}}{\sqrt{a}}\right] \left(a+b \operatorname{Cot}[c+d x]\right) \operatorname{Csc}[c+d x]^3 \operatorname{Sec}[c+d x]\right) \Big/ \left(\sqrt{a} \sqrt{b} \left(1+\operatorname{Cot}[c+d x]^2\right)^2 \left(b+a \operatorname{Tan}[c+d x]\right)\right)\right) - \right.$$

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

$$\left(2 \left(a^2+b^2\right) \left(-1+\operatorname{Cot}[c+d x]^2\right) \left(1+\operatorname{Cot}[c+d x]^2\right) \left(b+a \operatorname{Tan}[c+d x]\right)\right) - \frac{1}{4 \left(a^2+b^2\right) \left(1+\operatorname{Cot}[c+d x]^2\right) \left(b+a \operatorname{Tan}[c+d x]\right)}$$

$$b^3 \left(a+b \operatorname{Cot}[c+d x]\right) \operatorname{Csc}[c+d x]^2 \left(-8 \sqrt{a} \sqrt{b} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{\operatorname{Cot}[c+d x]}}{\sqrt{a}}\right] + \sqrt{2} \left(-2 (a+b) \operatorname{ArcTan}\left[1-\sqrt{2} \sqrt{\operatorname{Cot}[c+d x]}\right] + 2 (a+b) \operatorname{ArcTan}\left[1+\sqrt{2} \sqrt{\operatorname{Cot}[c+d x]}\right] + (a-b) \left(\operatorname{Log}\left[1-\sqrt{2} \sqrt{\operatorname{Cot}[c+d x]}+\operatorname{Cot}[c+d x]\right] - \operatorname{Log}\left[1+\sqrt{2} \sqrt{\operatorname{Cot}[c+d x]}+\operatorname{Cot}[c+d x]\right]\right)\right)\right) \operatorname{Sec}[c+d x]^2 \operatorname{Sin}[2 (c+d x)]\left.\right)$$

Problem 76: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 393 leaves, 15 steps):

$$-\frac{a^{3/2} \left(a^2+5 b^2\right) e^{5/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{a} \sqrt{e}}\right]}{b^{3/2} \left(a^2+b^2\right)^2 d}-\frac{\left(a^2+2 a b-b^2\right) e^{5/2} \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^2 d}+$$
$$\frac{\left(a^2+2 a b-b^2\right) e^{5/2} \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^2 d}+\frac{a^2 e^2 \sqrt{e \operatorname{Cot}[c+d x]}}{b \left(a^2+b^2\right) d \left(a+b \operatorname{Cot}[c+d x]\right)}+$$
$$\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^2 d}\left(a^2-2 a b-b^2\right) e^{5/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]-\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]-$$
$$\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^2 d}\left(a^2-2 a b-b^2\right) e^{5/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]+\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]$$

Result (type 3, 731 leaves):

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

$$\left(b\,(-\mathrm{i}\,a+b)\,(\mathrm{i}\,a+b)\,d\,(a+b\,\text{Cot}[c+d\,x])^2\right)+$$

$$\frac{1}{2\,(a-\mathrm{i}\,b)\,(a+\mathrm{i}\,b)\,b\,d\,\text{Cot}[c+d\,x]^{5/2}\,(a+b\,\text{Cot}[c+d\,x])^2}$$

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

$$\left(-\left(\left(2\,(a^2+b^2)\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]\,(a+b\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^3\,\text{Sec}[c+d\,x]\right)\Big/\right.\right.$$

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

$$\left(b^2\,\text{Cos}[2\,(c+d\,x)]\,(a+b\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^3\right.$$

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

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

$$\left.\left.\left.\left.\text{Cot}[c+d\,x]\right]-\text{Log}\left[1+\sqrt{2}\,\sqrt{\text{Cot}[c+d\,x]}+\text{Cot}[c+d\,x]\right]\right)\right)\right)\,\text{Sec}[c+d\,x]\right)\Big/$$

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

$$\frac{1}{4\,(a^2+b^2)\,(1+\text{Cot}[c+d\,x]^2)\,(b+a\,\text{Tan}[c+d\,x])}$$

$$a\,b\,(a+b\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^2\,\left(-8\,\sqrt{a}\,\sqrt{b}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.1+\sqrt{2}\,\sqrt{\text{Cot}[c+d\,x]}+\text{Cot}[c+d\,x]\right]\right)\right)\,\text{Sec}[c+d\,x]^2\,\text{Sin}[2\,(c+d\,x)]\right)\right)$$

Problem 80: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 437 leaves, 16 steps):

$$\frac{b^{5/2}\left(7 a^2+3 b^2\right) \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \text{Cot}[c+d x]}}{\sqrt{a} \sqrt{e}}\right]}{a^{5/2}\left(a^2+b^2\right)^2 d e^{3/2}}-$$

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

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

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

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

Result (type 3, 773 leaves) :

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

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

$$\text{Cot}[c+d x]^{3/2} \, \text{Csc}[c+d x]^2 \, (b \, \text{Cos}[c+d x]+a \, \text{Sin}[c+d x])^2$$

$$\left(-\left(\left(2 \left(3 a^2 b+3 b^3\right) \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{\text{Cot}[c+d x]}}{\sqrt{a}}\right] (a+b \, \text{Cot}[c+d x]) \, \text{Csc}[c+d x]^3 \, \text{Sec}[c+d x]\right)\Big/\left(\sqrt{a} \sqrt{b} \left(1+\text{Cot}[c+d x]^2\right)^2 (b+a \, \text{Tan}[c+d x])\right)\right)+\right.$$

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

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

$$\left.\left.\left.\left.\left.\text{Cot}[c+d x]\right]-\text{Log}\left[1+\sqrt{2} \sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]\right)\right)\right) \text{Sec}[c+d x]\right)\Big/$$

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

$$a^3 (a+b \, \text{Cot}[c+d x]) \, \text{Csc}[c+d x]^2 \left(-8 \sqrt{a} \sqrt{b} \, \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{\text{Cot}[c+d x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.1+\sqrt{2} \sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]\right)\right)\right) \text{Sec}[c+d x]^2 \, \text{Sin}[2 (c+d x)]$$

Problem 81: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 529 leaves, 17 steps):

$$\frac{a^{5/2} \left(15 a^4+46 a^2 b^2+63 b^4\right) e^{9/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{a} \sqrt{e}}\right]}{4 b^{7/2} \left(a^2+b^2\right)^3 d}+$$

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

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

$$\frac{\left(15 a^4+31 a^2 b^2+8 b^4\right) e^4 \sqrt{e \operatorname{Cot}[c+d x]}}{4 b^3 \left(a^2+b^2\right)^2 d}+\frac{a^2 e^2 (e \operatorname{Cot}[c+d x])^{5/2}}{2 b \left(a^2+b^2\right) d (a+b \operatorname{Cot}[c+d x])^2}+$$

$$\frac{a^2 \left(5 a^2+13 b^2\right) e^3 (e \operatorname{Cot}[c+d x])^{3/2}}{4 b^2 \left(a^2+b^2\right)^2 d (a+b \operatorname{Cot}[c+d x])}-\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d}$$

$$(a+b) \left(a^2-4 a b+b^2\right) e^{9/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]-\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]+$$

$$\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d}(a+b) \left(a^2-4 a b+b^2\right) e^{9/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]+\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]$$

Result (type 3, 897 leaves):

$$\left((e\,\text{Cot}[c+d\,x])^{9/2}\,\text{Sec}[c+d\,x]^3\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^3\left(-\frac{5\,a^4+8\,a^2\,b^2+4\,b^4}{2\,b^3\,(-\mathrm{i}\,a+b)^2\,(\mathrm{i}\,a+b)^2}+\frac{a^4}{2\,b\,(-\mathrm{i}\,a+b)^2\,(\mathrm{i}\,a+b)^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^2}+\frac{-5\,a^5\,\text{Sin}[c+d\,x]-17\,a^3\,b^2\,\text{Sin}[c+d\,x]}{4\,b^3\,(-\mathrm{i}\,a+b)^2\,(\mathrm{i}\,a+b)^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])}\right)\text{Tan}[c+d\,x]\right)\Big/$$

$$\left(d\,(a+b\,\text{Cot}[c+d\,x])^3\right)-\frac{1}{8\,(a-\mathrm{i}\,b)^2\,(a+\mathrm{i}\,b)^2\,b^3\,d\,\text{Cot}[c+d\,x]^{9/2}\,(a+b\,\text{Cot}[c+d\,x])^3}$$

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

$$\left(-\left(\left(2\,(15\,a^5+31\,a^3\,b^2+16\,a\,b^4)\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right](a+b\,\text{Cot}[c+d\,x])\right.\right.\right.$$

$$\left.\left.\text{Csc}[c+d\,x]^3\,\text{Sec}[c+d\,x]\right)\Big/\left(\sqrt{a}\,\sqrt{b}\,(1+\text{Cot}[c+d\,x]^2)^2\,(b+a\,\text{Tan}[c+d\,x])\right)\right)-$$

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

$$4\,a\,b^4\,\text{Cos}[2\,(c+d\,x)]\,(a+b\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^3$$

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

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

$$\left.\left.\left.\text{Cot}[c+d\,x]\right]-\text{Log}\left[1+\sqrt{2}\,\sqrt{\text{Cot}[c+d\,x]}+\text{Cot}[c+d\,x]\right]\right)\right)\right)\text{Sec}[c+d\,x]-$$

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

$$\text{Csc}[c+d\,x]^2\,\left(-8\,\sqrt{a}\,\sqrt{b}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.1+\sqrt{2}\,\sqrt{\text{Cot}[c+d\,x]}+\text{Cot}[c+d\,x]\right]\right)\right)\text{Sec}[c+d\,x]^2\,\text{Sin}[2\,(c+d\,x)]\right)$$

Problem 82: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 476 leaves, 16 steps):

$$-\frac{a^{3/2} \left(3 a^4+6 a^2 b^2+35 b^4\right) e^{7/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{a} \sqrt{e}}\right]}{4 b^{5/2} \left(a^2+b^2\right)^3 d}+\frac{(a+b) \left(a^2-4 a b+b^2\right) e^{7/2} \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^3 d}-\frac{(a+b) \left(a^2-4 a b+b^2\right) e^{7/2} \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^3 d}+\frac{a^2 e^2 (e \operatorname{Cot}[c+d x])^{3/2}}{2 b \left(a^2+b^2\right) d (a+b \operatorname{Cot}[c+d x])^2}+\frac{a^2 \left(3 a^2+11 b^2\right) e^3 \sqrt{e \operatorname{Cot}[c+d x]}}{4 b^2 \left(a^2+b^2\right)^2 d (a+b \operatorname{Cot}[c+d x])}+\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d}(a-b) \left(a^2+4 a b+b^2\right) e^{7/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]-\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]-\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d}(a-b) \left(a^2+4 a b+b^2\right) e^{7/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]+\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]$$

Result (type 3, 870 leaves):

$$\left((e\,\mathrm{Cot}[c+d\,x])^{7/2}\,\mathrm{Sec}[c+d\,x]^3\,(b\,\mathrm{Cos}[c+d\,x]+a\,\mathrm{Sin}[c+d\,x])^3\left(\frac{a^3}{2\,b^2\,(-\mathrm{i}\,a+b)^2\,(\mathrm{i}\,a+b)^2}-\frac{a^3}{2\,(-\mathrm{i}\,a+b)^2\,(\mathrm{i}\,a+b)^2\,(b\,\mathrm{Cos}[c+d\,x]+a\,\mathrm{Sin}[c+d\,x])^2}+\frac{a^4\,\mathrm{Sin}[c+d\,x]+13\,a^2\,b^2\,\mathrm{Sin}[c+d\,x]}{4\,b^2\,(-\mathrm{i}\,a+b)^2\,(\mathrm{i}\,a+b)^2\,(b\,\mathrm{Cos}[c+d\,x]+a\,\mathrm{Sin}[c+d\,x])}\right)\right)\Big/\left(d\,(a+b\,\mathrm{Cot}[c+d\,x])^3\right)+$$

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

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

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

$$\left((-4\,a^2\,b^2+4\,b^4)\,\mathrm{Cos}[2\,(c+d\,x)]\,(a+b\,\mathrm{Cot}[c+d\,x])\,\mathrm{Csc}[c+d\,x]^3\right.$$

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

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

$$\left.\left.\left.\left.\left.\mathrm{Cot}[c+d\,x]\right]-\mathrm{Log}\left[1+\sqrt{2}\,\sqrt{\mathrm{Cot}[c+d\,x]}+\mathrm{Cot}[c+d\,x]\right]\right)\right)\right)\,\mathrm{Sec}[c+d\,x]\right)\Big/$$

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

$$\frac{1}{(a^2+b^2)\,(1+\mathrm{Cot}[c+d\,x]^2)\,(b+a\,\mathrm{Tan}[c+d\,x])}$$

$$2\,a\,b^3\,(a+b\,\mathrm{Cot}[c+d\,x])\,\mathrm{Csc}[c+d\,x]^2\,\left(-8\,\sqrt{a}\,\sqrt{b}\,\mathrm{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\mathrm{Cot}[c+d\,x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.1+\sqrt{2}\,\sqrt{\mathrm{Cot}[c+d\,x]}+\mathrm{Cot}[c+d\,x]\right]\right)\right)\right)\,\mathrm{Sec}[c+d\,x]^2\,\mathrm{Sin}[2\,(c+d\,x)]\right)$$

Problem 83: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 470 leaves, 16 steps):

$$-\frac{\sqrt{a} \left(a^4+18 a^2 b^2-15 b^4\right) e^{5/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{a} \sqrt{e}}\right]}{4 b^{3/2} \left(a^2+b^2\right)^3 d}-\frac{(a-b) \left(a^2+4 a b+b^2\right) e^{5/2} \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^3 d}+\frac{(a-b) \left(a^2+4 a b+b^2\right) e^{5/2} \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^3 d}+\frac{a^2 e^2 \sqrt{e \operatorname{Cot}[c+d x]}}{2 b \left(a^2+b^2\right) d (a+b \operatorname{Cot}[c+d x])^2}-\frac{a \left(a^2+9 b^2\right) e^2 \sqrt{e \operatorname{Cot}[c+d x]}}{4 b \left(a^2+b^2\right)^2 d (a+b \operatorname{Cot}[c+d x])}+\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d} (a+b) \left(a^2-4 a b+b^2\right) e^{5/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]-\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]-\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d} (a+b) \left(a^2-4 a b+b^2\right) e^{5/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]+\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]$$

Result (type 3, 864 leaves):

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

Problem 84: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 461 leaves, 16 steps):

$$-\frac{\left(3 a^4-26 a^2 b^2+3 b^4\right) e^{3/2} \operatorname{ArcTan}\left[\frac{\sqrt{b} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{a} \sqrt{e}}\right]}{4 \sqrt{a} \sqrt{b} \left(a^2+b^2\right)^3 d}-\frac{(a+b) \left(a^2-4 a b+b^2\right) e^{3/2} \operatorname{ArcTan}\left[1-\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^3 d}+\frac{(a+b) \left(a^2-4 a b+b^2\right) e^{3/2} \operatorname{ArcTan}\left[1+\frac{\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2} \left(a^2+b^2\right)^3 d}-\frac{a e \sqrt{e \operatorname{Cot}[c+d x]}}{2 \left(a^2+b^2\right) d (a+b \operatorname{Cot}[c+d x])^2}-\frac{\left(3 a^2-5 b^2\right) e \sqrt{e \operatorname{Cot}[c+d x]}}{4 \left(a^2+b^2\right)^2 d (a+b \operatorname{Cot}[c+d x])}-\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d}(a-b) \left(a^2+4 a b+b^2\right) e^{3/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]-\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]+\frac{1}{2 \sqrt{2} \left(a^2+b^2\right)^3 d}(a-b) \left(a^2+4 a b+b^2\right) e^{3/2} \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]+\sqrt{2} \sqrt{e \operatorname{Cot}[c+d x]}\right]$$

Result (type 3, 851 leaves):

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

$$\left.\left(\frac{a}{2\,\left(-\mathbb{i}\,a+b\right)^2\,\left(\mathbb{i}\,a+b\right)^2}-\frac{a\,b^2}{2\,\left(-\mathbb{i}\,a+b\right)^2\,\left(\mathbb{i}\,a+b\right)^2\,\left(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]\right)^2}+\frac{-7\,a^2\,\text{Sin}[c+d\,x]+5\,b^2\,\text{Sin}[c+d\,x]}{4\,\left(-\mathbb{i}\,a+b\right)^2\,\left(\mathbb{i}\,a+b\right)^2\,\left(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]\right)}\right)\right)\Big/\left(d\,\left(a+b\,\text{Cot}[c+d\,x]\right)^3\right)+$$

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

$$\left(-\left(\left(2\,\left(-a^2-b^2\right)\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]\,\left(a+b\,\text{Cot}[c+d\,x]\right)\,\text{Csc}[c+d\,x]^3\,\text{Sec}[c+d\,x]\right)\Big/\right.\right.$$

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

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

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

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

$$\left.\left.\left.\left.\text{Cot}[c+d\,x]\right]-\text{Log}\left[1+\sqrt{2}\,\sqrt{\text{Cot}[c+d\,x]}+\text{Cot}[c+d\,x]\right]\right)\right)\right)\,\text{Sec}[c+d\,x]\right)\Big/$$

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

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

$$2\,a\,b\,\left(a+b\,\text{Cot}[c+d\,x]\right)\,\text{Csc}[c+d\,x]^2\,\left(-8\,\sqrt{a}\,\sqrt{b}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.1+\sqrt{2}\,\sqrt{\text{Cot}[c+d\,x]}+\text{Cot}[c+d\,x]\right]\right)\right)\right)\,\text{Sec}[c+d\,x]^2\,\text{Sin}\left[2\,\left(c+d\,x\right)\right]\right)$$

Problem 85: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 463 leaves, 16 steps):

$$\frac{\sqrt{b}\,\left(15\,a^4-18\,a^2\,b^2-b^4\right)\sqrt{e}\,\text{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\text{Cot}[c+d\,x]}}{\sqrt{a}\,\sqrt{e}}\right]}{4\,a^{3/2}\,\left(a^2+b^2\right)^3\,d}+\frac{(a-b)\,\left(a^2+4\,a\,b+b^2\right)\sqrt{e}\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{e\,\text{Cot}[c+d\,x]}}{\sqrt{e}}\right]}{\sqrt{2}\,\left(a^2+b^2\right)^3\,d}-\frac{(a-b)\,\left(a^2+4\,a\,b+b^2\right)\sqrt{e}\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{e\,\text{Cot}[c+d\,x]}}{\sqrt{e}}\right]}{\sqrt{2}\,\left(a^2+b^2\right)^3\,d}+\frac{b\,\sqrt{e\,\text{Cot}[c+d\,x]}}{2\,\left(a^2+b^2\right)\,d\,(a+b\,\text{Cot}[c+d\,x])^2}+\frac{b\,\left(7\,a^2-b^2\right)\sqrt{e\,\text{Cot}[c+d\,x]}}{4\,a\,\left(a^2+b^2\right)^2\,d\,(a+b\,\text{Cot}[c+d\,x])}-\frac{1}{2\,\sqrt{2}\,\left(a^2+b^2\right)^3\,d}(a+b)\,\left(a^2-4\,a\,b+b^2\right)\sqrt{e}\,\text{Log}\left[\sqrt{e}+\sqrt{e}\,\text{Cot}[c+d\,x]-\sqrt{2}\,\sqrt{e\,\text{Cot}[c+d\,x]}\right]+\frac{1}{2\,\sqrt{2}\,\left(a^2+b^2\right)^3\,d}(a+b)\,\left(a^2-4\,a\,b+b^2\right)\sqrt{e}\,\text{Log}\left[\sqrt{e}+\sqrt{e}\,\text{Cot}[c+d\,x]+\sqrt{2}\,\sqrt{e\,\text{Cot}[c+d\,x]}\right]$$

Result (type 3, 852 leaves):

$$\left(\sqrt{e\,\text{Cot}[c+d\,x]}\;\text{Csc}[c+d\,x]^3\,\left(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]\right)^3\right.$$

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

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

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

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

$$\left(-\left(\left(2\,\left(a^2\,b+b^3\right)\,\text{ArcTan}\left[\frac{\sqrt{b}\;\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]\,\left(a+b\,\text{Cot}[c+d\,x]\right)\,\text{Csc}[c+d\,x]^3\,\text{Sec}[c+d\,x]\right)\Big/\right.\right.$$

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

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

$$4\,a^2\,b\,\text{Cos}\left[2\,\left(c+d\,x\right)\right]\,\left(a+b\,\text{Cot}[c+d\,x]\right)\,\text{Csc}[c+d\,x]^3$$

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

$$2\,\left(a-b\right)\,\text{ArcTan}\left[1+\sqrt{2}\;\sqrt{\text{Cot}[c+d\,x]}\;\right]+\left(a+b\right)\,\left(\text{Log}\left[1-\sqrt{2}\;\sqrt{\text{Cot}[c+d\,x]}\;+\right.\right.$$

$$\left.\left.\left.\left.\text{Cot}[c+d\,x]\right]-\text{Log}\left[1+\sqrt{2}\;\sqrt{\text{Cot}[c+d\,x]}\;+\text{Cot}[c+d\,x]\right]\right)\right)\right)\,\text{Sec}[c+d\,x]-$$

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

$$\text{Csc}[c+d\,x]^2\,\left(-8\,\sqrt{a}\;\sqrt{b}\;\text{ArcTan}\left[\frac{\sqrt{b}\;\sqrt{\text{Cot}[c+d\,x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.\left.1+\sqrt{2}\;\sqrt{\text{Cot}[c+d\,x]}\;+\text{Cot}[c+d\,x]\right]\right)\right)\right)\,\text{Sec}[c+d\,x]^2\,\text{Sin}\left[2\,\left(c+d\,x\right)\right]\right)$$

Problem 86: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{\sqrt{e \operatorname{Cot}[c+d x]}\,(a+b \operatorname{Cot}[c+d x])^3}\, dx$$

Optimal (type 3, 476 leaves, 16 steps):

$$-\frac{b^{3/2}\left(35 a^4+6 a^2 b^2+3 b^4\right) \operatorname{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{a}\,\sqrt{e}}\right]}{4 a^{5/2}\left(a^2+b^2\right)^3 d \sqrt{e}}+\frac{(a+b)\left(a^2-4 a b+b^2\right) \operatorname{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2}\left(a^2+b^2\right)^3 d \sqrt{e}}-\frac{(a+b)\left(a^2-4 a b+b^2\right) \operatorname{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{e \operatorname{Cot}[c+d x]}}{\sqrt{e}}\right]}{\sqrt{2}\left(a^2+b^2\right)^3 d \sqrt{e}}-\frac{b^2 \sqrt{e \operatorname{Cot}[c+d x]}}{2 a\left(a^2+b^2\right) d e\,(a+b \operatorname{Cot}[c+d x])^2}-\frac{b^2\left(11 a^2+3 b^2\right) \sqrt{e \operatorname{Cot}[c+d x]}}{4 a^2\left(a^2+b^2\right)^2 d e\,(a+b \operatorname{Cot}[c+d x])}+\left((a-b)\left(a^2+4 a b+b^2\right) \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]-\sqrt{2}\,\sqrt{e \operatorname{Cot}[c+d x]}\right]\right) \Big/ \left(2 \sqrt{2}\left(a^2+b^2\right)^3 d \sqrt{e}\right)-\left((a-b)\left(a^2+4 a b+b^2\right) \operatorname{Log}\left[\sqrt{e}+\sqrt{e} \operatorname{Cot}[c+d x]+\sqrt{2}\,\sqrt{e \operatorname{Cot}[c+d x]}\right]\right) \Big/ \left(2 \sqrt{2}\left(a^2+b^2\right)^3 d \sqrt{e}\right)$$

Result (type 3, 879 leaves):

$$\left(\text{Cot}[c+d x]\,\text{Csc}[c+d x]^3\,(b\,\text{Cos}[c+d x]+a\,\text{Sin}[c+d x])^3\right.$$

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

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

$$\frac{1}{8 a^2 (a-i b)^2 (a+i b)^2 d\sqrt{e\,\text{Cot}[c+d x]}\,(a+b\,\text{Cot}[c+d x])^3}$$

$$\sqrt{\text{Cot}[c+d x]}\,\text{Csc}[c+d x]^3\,(b\,\text{Cos}[c+d x]+a\,\text{Sin}[c+d x])^3$$

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

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

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

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

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

$$\left.\left.\left.\left.\left.\text{Cot}[c+d x]\right]-\text{Log}\left[1+\sqrt{2}\sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]\right)\right)\right)\text{Sec}[c+d x]\right)\Big/$$

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

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

$$2 a^3 b\,(a+b\,\text{Cot}[c+d x])\,\text{Csc}[c+d x]^2\left(-8\sqrt{a}\sqrt{b}\,\text{ArcTan}\left[\frac{\sqrt{b}\sqrt{\text{Cot}[c+d x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$

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

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

$$\left.\left.\left.\left.1+\sqrt{2}\sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]\right)\right)\text{Sec}[c+d x]^2\,\text{Sin}[2(c+d x)]\right)\right)$$

Problem 87: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 529 leaves, 17 steps):

$$\frac{b^{5/2}\,(63\,a^4+46\,a^2\,b^2+15\,b^4)\,\mathrm{ArcTan}\left[\frac{\sqrt{b}\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a}\,\sqrt{e}}\right]}{4\,a^{7/2}\,(a^2+b^2)^3\,d\,e^{3/2}}-$$
$$\frac{(a-b)\,(a^2+4\,a\,b+b^2)\,\mathrm{ArcTan}\left[1-\frac{\sqrt{2}\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}}{\sqrt{e}}\right]}{\sqrt{2}\,(a^2+b^2)^3\,d\,e^{3/2}}+$$
$$\frac{(a-b)\,(a^2+4\,a\,b+b^2)\,\mathrm{ArcTan}\left[1+\frac{\sqrt{2}\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}}{\sqrt{e}}\right]}{\sqrt{2}\,(a^2+b^2)^3\,d\,e^{3/2}}+\frac{8\,a^4+31\,a^2\,b^2+15\,b^4}{4\,a^3\,(a^2+b^2)^2\,d\,e\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}}-$$
$$\frac{b^2}{2\,a\,(a^2+b^2)\,d\,e\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}\,(a+b\,\mathrm{Cot}[c+d\,x])^2}-$$
$$\frac{b^2\,(13\,a^2+5\,b^2)}{4\,a^2\,(a^2+b^2)^2\,d\,e\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}\,(a+b\,\mathrm{Cot}[c+d\,x])}+$$
$$\left((a+b)\,(a^2-4\,a\,b+b^2)\,\mathrm{Log}\left[\sqrt{e}+\sqrt{e}\,\mathrm{Cot}[c+d\,x]-\sqrt{2}\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}\right]\right)\Big/$$
$$\left(2\,\sqrt{2}\,(a^2+b^2)^3\,d\,e^{3/2}\right)-$$
$$\left((a+b)\,(a^2-4\,a\,b+b^2)\,\mathrm{Log}\left[\sqrt{e}+\sqrt{e}\,\mathrm{Cot}[c+d\,x]+\sqrt{2}\,\sqrt{e\,\mathrm{Cot}[c+d\,x]}\right]\right)\Big/$$
$$\left(2\,\sqrt{2}\,(a^2+b^2)^3\,d\,e^{3/2}\right)$$

Result (type 3, 894 leaves):

$$\left(\text{Cot}[c+d x]^2 \text{Csc}[c+d x]^3 (b \text{Cos}[c+d x]+a \text{Sin}[c+d x])^3\right.$$
$$\left(-\frac{b^3}{2 a^2 (-\mathrm{i} a+b)^2 (\mathrm{i} a+b)^2}+\frac{b^5}{2 a^2 (-\mathrm{i} a+b)^2 (\mathrm{i} a+b)^2 (b \text{Cos}[c+d x]+a \text{Sin}[c+d x])^2}+\right.$$
$$\left.\left.\frac{19 a^2 b^3 \text{Sin}[c+d x]+7 b^5 \text{Sin}[c+d x]}{4 a^3 (-\mathrm{i} a+b)^2 (\mathrm{i} a+b)^2 (b \text{Cos}[c+d x]+a \text{Sin}[c+d x])}+\frac{2 \text{Tan}[c+d x]}{a^3}\right)\right)\Big/$$
$$\left(d (e \text{Cot}[c+d x])^{3/2} (a+b \text{Cot}[c+d x])^3\right)-$$
$$\frac{1}{8 a^3 (a-\mathrm{i} b)^2 (a+\mathrm{i} b)^2 d (e \text{Cot}[c+d x])^{3/2} (a+b \text{Cot}[c+d x])^3}$$
$$\text{Cot}[c+d x]^{3/2} \text{Csc}[c+d x]^3 (b \text{Cos}[c+d x]+a \text{Sin}[c+d x])^3$$
$$\left(-\left(\left(2 \left(16 a^4 b+31 a^2 b^3+15 b^5\right) \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{\text{Cot}[c+d x]}}{\sqrt{a}}\right] (a+b \text{Cot}[c+d x])\right.\right.\right.$$
$$\left.\left.\text{Csc}[c+d x]^3 \text{Sec}[c+d x]\right)\Big/\left(\sqrt{a} \sqrt{b} \left(1+\text{Cot}[c+d x]^2\right)^2 (b+a \text{Tan}[c+d x])\right)\right)+$$
$$\left(1\Big/\left(\left(a^2+b^2\right) \left(-1+\text{Cot}[c+d x]^2\right) \left(1+\text{Cot}[c+d x]^2\right) (b+a \text{Tan}[c+d x])\right)\right)$$
$$4 a^4 b \text{Cos}[2 (c+d x)] (a+b \text{Cot}[c+d x]) \text{Csc}[c+d x]^3$$
$$\left(\frac{4 \left(a^2-b^2\right) \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{\text{Cot}[c+d x]}}{\sqrt{a}}\right]}{\sqrt{a} \sqrt{b}}+\sqrt{2} \left(2 (a-b) \text{ArcTan}\left[1-\sqrt{2} \sqrt{\text{Cot}[c+d x]}\right]-\right.\right.$$
$$2 (a-b) \text{ArcTan}\left[1+\sqrt{2} \sqrt{\text{Cot}[c+d x]}\right]+(a+b) \left(\text{Log}\left[1-\sqrt{2} \sqrt{\text{Cot}[c+d x]}+\right.\right.$$
$$\left.\left.\left.\left.\text{Cot}[c+d x]\right]-\text{Log}\left[1+\sqrt{2} \sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]\right)\right)\right) \text{Sec}[c+d x]-$$
$$\frac{1}{4 \left(a^2+b^2\right) \left(1+\text{Cot}[c+d x]^2\right) (b+a \text{Tan}[c+d x])} \left(4 a^5-4 a^3 b^2\right) (a+b \text{Cot}[c+d x])$$
$$\text{Csc}[c+d x]^2 \left(-8 \sqrt{a} \sqrt{b} \text{ArcTan}\left[\frac{\sqrt{b} \sqrt{\text{Cot}[c+d x]}}{\sqrt{a}}\right]+\sqrt{2}\right.$$
$$\left(-2 (a+b) \text{ArcTan}\left[1-\sqrt{2} \sqrt{\text{Cot}[c+d x]}\right]+2 (a+b) \text{ArcTan}\left[1+\sqrt{2} \sqrt{\text{Cot}[c+d x]}\right]+\right.$$
$$(a-b) \left(\text{Log}\left[1-\sqrt{2} \sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]-\text{Log}\left[\right.\right.$$
$$\left.\left.\left.\left.\left.1+\sqrt{2} \sqrt{\text{Cot}[c+d x]}+\text{Cot}[c+d x]\right]\right)\right)\right) \text{Sec}[c+d x]^2 \text{Sin}[2 (c+d x)]\right)$$

Problem 88: Result unnecessarily involves imaginary or complex numbers.

$$\int (a+b\,\mathrm{Cot}[c+d\,x])^n\,dx$$

Optimal (type 5, 167 leaves, 5 steps):

$$-\left(\left(b\,(a+b\,\mathrm{Cot}[c+d\,x])^{1+n}\,\mathrm{Hypergeometric2F1}\left[1,1+n,2+n,\frac{a+b\,\mathrm{Cot}[c+d\,x]}{a-\sqrt{-b^2}}\right]\right)\Big/\left(2\sqrt{-b^2}\,\left(a-\sqrt{-b^2}\right)\,d\,(1+n)\right)\right)+\left(b\,(a+b\,\mathrm{Cot}[c+d\,x])^{1+n}\,\mathrm{Hypergeometric2F1}\left[1,1+n,2+n,\frac{a+b\,\mathrm{Cot}[c+d\,x]}{a+\sqrt{-b^2}}\right]\right)\Big/\left(2\sqrt{-b^2}\,\left(a+\sqrt{-b^2}\right)\,d\,(1+n)\right)$$

Result (type 5, 161 leaves):

$$\frac{1}{2\,d\,n}\,i\,(a+b\,\mathrm{Cot}[c+d\,x])^n\left(\left(\frac{a+b\,\mathrm{Cot}[c+d\,x]}{b\,(-i+\mathrm{Cot}[c+d\,x])}\right)^{-n}\mathrm{Hypergeometric2F1}\left[-n,-n,1-n,-\frac{a+i\,b}{b\,(-i+\mathrm{Cot}[c+d\,x])}\right]-\left(\frac{a+b\,\mathrm{Cot}[c+d\,x]}{b\,(i+\mathrm{Cot}[c+d\,x])}\right)^{-n}\mathrm{Hypergeometric2F1}\left[-n,-n,1-n,\frac{-a+i\,b}{b\,(i+\mathrm{Cot}[c+d\,x])}\right]\right)$$

Problem 89: Unable to integrate problem.

$$\int (a+b\,\mathrm{Cot}[e+f\,x])^m\,(d\,\mathrm{Tan}[e+f\,x])^n\,dx$$

Optimal (type 6, 193 leaves, 8 steps):

$$-\frac{1}{2\,f\,(1-n)}\mathrm{AppellF1}\left[1-n,-m,1,2-n,-\frac{b\,\mathrm{Cot}[e+f\,x]}{a},-i\,\mathrm{Cot}[e+f\,x]\right]\mathrm{Cot}[e+f\,x]\,(a+b\,\mathrm{Cot}[e+f\,x])^m\left(1+\frac{b\,\mathrm{Cot}[e+f\,x]}{a}\right)^{-m}(d\,\mathrm{Tan}[e+f\,x])^n-\frac{1}{2\,f\,(1-n)}\mathrm{AppellF1}\left[1-n,-m,1,2-n,-\frac{b\,\mathrm{Cot}[e+f\,x]}{a},i\,\mathrm{Cot}[e+f\,x]\right]\mathrm{Cot}[e+f\,x]\,(a+b\,\mathrm{Cot}[e+f\,x])^m\left(1+\frac{b\,\mathrm{Cot}[e+f\,x]}{a}\right)^{-m}(d\,\mathrm{Tan}[e+f\,x])^n$$

Result (type 8, 25 leaves):

$$\int (a+b\,\mathrm{Cot}[e+f\,x])^m\,(d\,\mathrm{Tan}[e+f\,x])^n\,dx$$

Problem 91: Result more than twice size of optimal antiderivative.

$$\int \frac{1 - i \operatorname{Cot}[c + d x]}{\sqrt{a + b \operatorname{Cot}[c + d x]}} \, dx$$

Optimal (type 3, 45 leaves, 3 steps):

$$-\frac{2 i \operatorname{ArcTanh}\left[\frac{\sqrt{a+b \operatorname{Cot}[c+d x]}}{\sqrt{a+i b}}\right]}{\sqrt{a+i b}\, d}$$

Result (type 3, 128 leaves):

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

Problem 93: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{A + B \operatorname{Cot}[c + d x]}{\left(a + b \operatorname{Cot}[c + d x]\right)^2} \, dx$$

Optimal (type 3, 111 leaves, 3 steps):

$$\frac{\left(a^2 A - A b^2 + 2 a b B\right) x}{\left(a^2 + b^2\right)^2} + \frac{A b - a B}{\left(a^2 + b^2\right) d \left(a + b \operatorname{Cot}[c + d x]\right)} - \frac{\left(2 a A b - a^2 B + b^2 B\right) \operatorname{Log}[b \operatorname{Cos}[c + d x] + a \operatorname{Sin}[c + d x]]}{\left(a^2 + b^2\right)^2 d}$$

Result (type 3, 352 leaves):

$$\frac{1}{2 \left(a^2 + b^2\right)^2 d \left(a + b \operatorname{Cot}[c + d x]\right)} \Big(2 a^2 A b + 2 A b^3 - 2 a^3 B - 2 a b^2 B + 2 a^3 A c - 4 i a^2 A b c - 2 a A b^2 c + 2 i a^3 B c +$$
$$4 a^2 b B c - 2 i a b^2 B c + 2 a^3 A d x - 4 i a^2 A b d x - 2 a A b^2 d x + 2 i a^3 B d x + 4 a^2 b B d x -$$
$$2 i a b^2 B d x - 2 i \left(-2 a A b + a^2 B - b^2 B\right) \operatorname{ArcTan}[\operatorname{Tan}[c + d x]] \left(a + b \operatorname{Cot}[c + d x]\right) -$$
$$2 a^2 A b \operatorname{Log}\left[\left(b \operatorname{Cos}[c + d x] + a \operatorname{Sin}[c + d x]\right)^2\right] + a^3 B \operatorname{Log}\left[\left(b \operatorname{Cos}[c + d x] + a \operatorname{Sin}[c + d x]\right)^2\right] -$$
$$a b^2 B \operatorname{Log}\left[\left(b \operatorname{Cos}[c + d x] + a \operatorname{Sin}[c + d x]\right)^2\right] + b \operatorname{Cot}[c + d x]$$
$$\left(2 (a - i b)^2 (A + i B) (c + d x) + \left(-2 a A b + a^2 B - b^2 B\right) \operatorname{Log}\left[\left(b \operatorname{Cos}[c + d x] + a \operatorname{Sin}[c + d x]\right)^2\right]\right)\Big)$$

Problem 94: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{A+B\,\mathrm{Cot}[c+d\,x]}{(a+b\,\mathrm{Cot}[c+d\,x])^3}\,dx$$

Optimal (type 3, 175 leaves, 4 steps):

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

Result (type 3, 863 leaves):

$$\left(b^2 (A b-a B) (A+B\,\mathrm{Cot}[c+d x]) \mathrm{Csc}[c+d x]^2 (b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])\right) \Big/ \left(2 (-i a+b)^2 (i a+b)^2 d (a+b\,\mathrm{Cot}[c+d x])^3 (B\,\mathrm{Cos}[c+d x]+A\,\mathrm{Sin}[c+d x])\right) -$$
$$\left(\left(-a^3 A+3 a A b^2-3 a^2 b B+b^3 B\right) (c+d x) (A+B\,\mathrm{Cot}[c+d x]) \mathrm{Csc}[c+d x]^2 (b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])^3\right) \Big/ \left((-i a+b)^3 (i a+b)^3 d (a+b\,\mathrm{Cot}[c+d x])^3 (B\,\mathrm{Cos}[c+d x]+A\,\mathrm{Sin}[c+d x])\right) +$$
$$\left(\left(-3 i a^7 A b^3+3 a^6 A b^4-5 i a^5 A b^5+5 a^4 A b^6-i a^3 A b^7+a^2 A b^8+i a A b^9-A b^{10}+i a^8 b^2 B-a^7 b^3 B-i a^6 b^4 B+a^5 b^5 B-5 i a^4 b^6 B+5 a^3 b^7 B-3 i a^2 b^8 B+3 a b^9 B\right) (c+d x) (A+B\,\mathrm{Cot}[c+d x]) \mathrm{Csc}[c+d x]^2 (b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])^3\right) \Big/ \left((a-i b)^2 (a+i b)^3 b^2 (-i a+b)^3 (i a+b)^3 d (a+b\,\mathrm{Cot}[c+d x])^3 (B\,\mathrm{Cos}[c+d x]+A\,\mathrm{Sin}[c+d x])\right) -$$
$$\left(i \left(-3 a^2 A b+A b^3+a^3 B-3 a b^2 B\right) \mathrm{ArcTan}[\mathrm{Tan}[c+d x]] (A+B\,\mathrm{Cot}[c+d x]) \mathrm{Csc}[c+d x]^2 (b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])^3\right) \Big/ \left(\left(a^2+b^2\right)^3 d (a+b\,\mathrm{Cot}[c+d x])^3 (B\,\mathrm{Cos}[c+d x]+A\,\mathrm{Sin}[c+d x])\right) +$$
$$\left(\left(-3 a^2 A b+A b^3+a^3 B-3 a b^2 B\right) (A+B\,\mathrm{Cot}[c+d x]) \mathrm{Csc}[c+d x]^2 \mathrm{Log}\left[(b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])^2\right] (b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])^3\right) \Big/ \left(2 \left(a^2+b^2\right)^3 d (a+b\,\mathrm{Cot}[c+d x])^3 (B\,\mathrm{Cos}[c+d x]+A\,\mathrm{Sin}[c+d x])\right) +$$
$$\left((A+B\,\mathrm{Cot}[c+d x]) \mathrm{Csc}[c+d x]^2 (b\,\mathrm{Cos}[c+d x]+a\,\mathrm{Sin}[c+d x])^2 \left(3 a A b\,\mathrm{Sin}[c+d x]-2 a^2 B\,\mathrm{Sin}[c+d x]+b^2 B\,\mathrm{Sin}[c+d x]\right)\right) \Big/ \left((-i a+b)^2 (i a+b)^2 d (a+b\,\mathrm{Cot}[c+d x])^3 (B\,\mathrm{Cos}[c+d x]+A\,\mathrm{Sin}[c+d x])\right)$$

Problem 95: Result more than twice size of optimal antiderivative.

$$\int (a+b\,\mathrm{Cot}[c+d\,x])^{5/2} (A+B\,\mathrm{Cot}[c+d\,x])\,dx$$

Optimal (type 3, 188 leaves, 10 steps):

$$\frac{(a-\mathrm{i}\,b)^{5/2}\,(\mathrm{i}\,A+B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a-\mathrm{i}\,b}}\right]}{d}-\frac{(a+\mathrm{i}\,b)^{5/2}\,(\mathrm{i}\,A-B)\,\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a+\mathrm{i}\,b}}\right]}{d}-\frac{2\,(2\,a\,A\,b+a^2\,B-b^2\,B)\,\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{d}-\frac{2\,(A\,b+a\,B)\,(a+b\,\mathrm{Cot}[c+d\,x])^{3/2}}{3\,d}-\frac{2\,B\,(a+b\,\mathrm{Cot}[c+d\,x])^{5/2}}{5\,d}$$

Result (type 3, 505 leaves) :

$$\left(\mathrm{i}\,(a^3\,A-3\,a\,A\,b^2-3\,a^2\,b\,B+b^3\,B)\left(\frac{\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a-\mathrm{i}\,b}}\right]}{\sqrt{a-\mathrm{i}\,b}}-\frac{\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a+\mathrm{i}\,b}}\right]}{\sqrt{a+\mathrm{i}\,b}}\right)(a+b\,\mathrm{Cot}[c+d\,x])^3\,(A+B\,\mathrm{Cot}[c+d\,x])\,\mathrm{Sin}[c+d\,x]^4\right)\Big/$$
$$\left(d\,(b\,\mathrm{Cos}[c+d\,x]+a\,\mathrm{Sin}[c+d\,x])^3\,(B\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sin}[c+d\,x])\right)+$$
$$\left((3\,a^2\,A\,b-A\,b^3+a^3\,B-3\,a\,b^2\,B)\left(\frac{\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a-\mathrm{i}\,b}}\right]}{\sqrt{a-\mathrm{i}\,b}}+\frac{\mathrm{ArcTanh}\left[\frac{\sqrt{a+b\,\mathrm{Cot}[c+d\,x]}}{\sqrt{a+\mathrm{i}\,b}}\right]}{\sqrt{a+\mathrm{i}\,b}}\right)(a+b\,\mathrm{Cot}[c+d\,x])^3\,(A+B\,\mathrm{Cot}[c+d\,x])\,\mathrm{Sin}[c+d\,x]^4\right)\Big/$$
$$\left(d\,(b\,\mathrm{Cos}[c+d\,x]+a\,\mathrm{Sin}[c+d\,x])^3\,(B\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sin}[c+d\,x])\right)+$$
$$\left((a+b\,\mathrm{Cot}[c+d\,x])^{5/2}\,(A+B\,\mathrm{Cot}[c+d\,x])\left(\frac{2}{15}\,(-35\,a\,A\,b-23\,a^2\,B+18\,b^2\,B)-\frac{2}{15}\,(5\,A\,b^2\,\mathrm{Cos}[c+d\,x]+11\,a\,b\,B\,\mathrm{Cos}[c+d\,x])\,\mathrm{Csc}[c+d\,x]-\frac{2}{5}\,b^2\,B\,\mathrm{Csc}[c+d\,x]^2\right)\mathrm{Sin}[c+d\,x]^3\right)\Big/\left(d\,(b\,\mathrm{Cos}[c+d\,x]+a\,\mathrm{Sin}[c+d\,x])^2\,(B\,\mathrm{Cos}[c+d\,x]+A\,\mathrm{Sin}[c+d\,x])\right)$$

Problem 96: Result more than twice size of optimal antiderivative.

$$\int(a+b\,\mathrm{Cot}[c+d\,x])^{3/2}\,(A+B\,\mathrm{Cot}[c+d\,x])\,dx$$

Optimal (type 3, 150 leaves, 9 steps) :

$$\frac{(a-\mathrm{i}\,b)^{3/2}\,(\mathrm{i}\,A+B)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-\mathrm{i}\,b}}\right]}{d}-\frac{(a+\mathrm{i}\,b)^{3/2}\,(\mathrm{i}\,A-B)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+\mathrm{i}\,b}}\right]}{d}-\frac{2\,(A\,b+a\,B)\,\sqrt{a+b\,\text{Cot}[c+d\,x]}}{d}-\frac{2\,B\,(a+b\,\text{Cot}[c+d\,x])^{3/2}}{3\,d}$$

Result (type 3, 441 leaves):

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

Problem 98: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 151 leaves, 10 steps):

$$-\frac{(\mathrm{i}\,a-b)\,(a-\mathrm{i}\,b)^{5/2}\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-\mathrm{i}\,b}}\right]}{d}+\frac{(a+\mathrm{i}\,b)^{5/2}\,(\mathrm{i}\,a+b)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+\mathrm{i}\,b}}\right]}{d}+\frac{2\,b\,(a^2+b^2)\,\sqrt{a+b\,\text{Cot}[c+d\,x]}}{d}-\frac{2\,b\,(a+b\,\text{Cot}[c+d\,x])^{5/2}}{5\,d}$$

Result (type 3, 479 leaves):

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

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

Problem 99: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 408 leaves, 13 steps) :

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

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

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

$$\left(2\sqrt{2}\sqrt{a+\sqrt{a^2+b^2}}\,d\right)-$$

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

$$\left(2\sqrt{2}\sqrt{a+\sqrt{a^2+b^2}}\,d\right)$$

Result (type 3, 178 leaves):

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

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

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

Problem 100: Result unnecessarily involves imaginary or complex numbers.

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

Optimal (type 3, 422 leaves, 13 steps):

$$\frac{b\sqrt{a^2+b^2}\,\text{ArcTanh}\left[\frac{\sqrt{a+\sqrt{a^2+b^2}}-\sqrt{2}\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-\sqrt{a^2+b^2}}}\right]}{\sqrt{2}\sqrt{a-\sqrt{a^2+b^2}}\,d}-$$

$$\frac{b\sqrt{a^2+b^2}\,\text{ArcTanh}\left[\frac{\sqrt{a+\sqrt{a^2+b^2}}+\sqrt{2}\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-\sqrt{a^2+b^2}}}\right]}{\sqrt{2}\sqrt{a-\sqrt{a^2+b^2}}\,d}-\frac{2\,b\sqrt{a+b\,\text{Cot}[c+d\,x]}}{d}-$$

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

$$\left(2\sqrt{2}\sqrt{a+\sqrt{a^2+b^2}}\,d\right)+$$

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

$$\left(2\sqrt{2}\sqrt{a+\sqrt{a^2+b^2}}\,d\right)$$

Result (type 3, 158 leaves):

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

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

Problem 102: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 138 leaves, 8 steps):

$$\frac{(i A+B)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{(a-i\,b)^{3/2}\,d}-\frac{(i A-B)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{(a+i\,b)^{3/2}\,d}+\frac{2\,(A\,b-a\,B)}{(a^2+b^2)\,d\,\sqrt{a+b\,\text{Cot}[c+d\,x]}}$$

Result (type 3, 476 leaves):

$$\Big(2\,(A+B\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])\,(A\,b\,\text{Sin}[c+d\,x]-a\,B\,\text{Sin}[c+d\,x])\Big)\Big/\Big((-i\,a+b)\,(i\,a+b)\,d\,(a+b\,\text{Cot}[c+d\,x])^{3/2}\,(B\,\text{Cos}[c+d\,x]+A\,\text{Sin}[c+d\,x])\Big)+$$

$$\left((A+B\,\text{Cot}[c+d\,x])\,\sqrt{\text{Csc}[c+d\,x]}\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^{3/2}\left(\left(i\,(a\,A+b\,B)\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{\sqrt{a-i\,b}}-\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{\sqrt{a+i\,b}}\right)\sqrt{a+b\,\text{Cot}[c+d\,x]}\right)\Big/\left(\sqrt{\text{Csc}[c+d\,x]}\,\sqrt{b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]}\right)+\left((-A\,b+a\,B)\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{\sqrt{a-i\,b}}+\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{\sqrt{a+i\,b}}\right)\sqrt{a+b\,\text{Cot}[c+d\,x]}\right)\Big/\left(\sqrt{\text{Csc}[c+d\,x]}\,\sqrt{b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]}\right)\right)\right)\Big/\Big((a-i\,b)\,(a+i\,b)\,d\,(a+b\,\text{Cot}[c+d\,x])^{3/2}\,(B\,\text{Cos}[c+d\,x]+A\,\text{Sin}[c+d\,x])\Big)$$

Problem 103: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 185 leaves, 9 steps):

$$\frac{(i A+B)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{(a-i\,b)^{5/2}\,d}-\frac{(i A-B)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{(a+i\,b)^{5/2}\,d}+\frac{2\,(A\,b-a\,B)}{3\,(a^2+b^2)\,d\,(a+b\,\text{Cot}[c+d\,x])^{3/2}}+\frac{2\,(2\,a\,A\,b-a^2\,B+b^2\,B)}{(a^2+b^2)^2\,d\,\sqrt{a+b\,\text{Cot}[c+d\,x]}}$$

Result (type 3, 620 leaves):

$$\left((A+B\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^{3/2}\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^{5/2}\left(\left(\left(i\,(a^2 A-A\,b^2+2\,a\,b\,B)\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{\sqrt{a-i\,b}}-\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{\sqrt{a+i\,b}}\right)\sqrt{a+b\,\text{Cot}[c+d\,x]}\right)\Big/\left(\sqrt{\text{Csc}[c+d\,x]}\,\sqrt{b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]}\right)+\left((-2\,a\,A\,b+a^2 B-b^2 B)\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{\sqrt{a-i\,b}}+\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{\sqrt{a+i\,b}}\right)\sqrt{a+b\,\text{Cot}[c+d\,x]}\right)\Big/\left(\sqrt{\text{Csc}[c+d\,x]}\,\sqrt{b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]}\right)\right)\right)\Big/$$
$$\left((a-i\,b)^2\,(a+i\,b)^2\,d\,(a+b\,\text{Cot}[c+d\,x])^{5/2}\,(B\,\text{Cos}[c+d\,x]+A\,\text{Sin}[c+d\,x])\right)+$$
$$\left((A+B\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^3\left(-\frac{2\,(A\,b-a\,B)}{3\,(-i\,a+b)^2\,(i\,a+b)^2}+\frac{2\,b^2\,(A\,b-a\,B)}{3\,(-i\,a+b)^2\,(i\,a+b)^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^2}+\frac{2\,(8\,a\,A\,b\,\text{Sin}[c+d\,x]-5\,a^2 B\,\text{Sin}[c+d\,x]+3\,b^2 B\,\text{Sin}[c+d\,x])}{3\,(-i\,a+b)^2\,(i\,a+b)^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])}\right)\right)\Big/$$
$$\left(d\,(a+b\,\text{Cot}[c+d\,x])^{5/2}\,(B\,\text{Cos}[c+d\,x]+A\,\text{Sin}[c+d\,x])\right)$$

Problem 106: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 174 leaves, 9 steps):

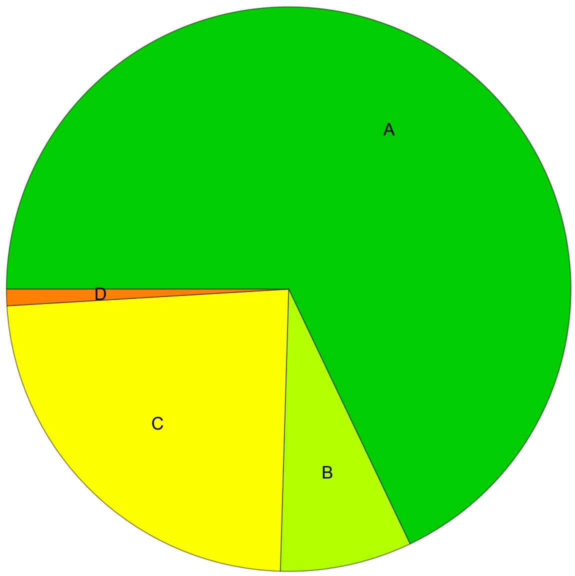
$$-\frac{(i\,a-b)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-i\,b}}\right]}{(a-i\,b)^{5/2}\,d}+\frac{(i\,a+b)\,\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+i\,b}}\right]}{(a+i\,b)^{5/2}\,d}-\frac{4\,a\,b}{3\,(a^2+b^2)\,d\,(a+b\,\text{Cot}[c+d\,x])^{3/2}}-\frac{2\,b\,(3\,a^2-b^2)}{(a^2+b^2)^2\,d\,\sqrt{a+b\,\text{Cot}[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

Result (type 3, 587 leaves) :

$$\left((-a+b\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^{3/2}\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^{5/2}\left(\left(\dot{\imath}\,(a^3-3\,a\,b^2)\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-\dot{\imath}\,b}}\right]}{\sqrt{a-\dot{\imath}\,b}}-\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+\dot{\imath}\,b}}\right]}{\sqrt{a+\dot{\imath}\,b}}\right)\sqrt{a+b\,\text{Cot}[c+d\,x]}\right)\Big/\left(\sqrt{\text{Csc}[c+d\,x]}\,\sqrt{b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]}\right)+\left((-3\,a^2\,b+b^3)\left(\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a-\dot{\imath}\,b}}\right]}{\sqrt{a-\dot{\imath}\,b}}+\frac{\text{ArcTanh}\left[\frac{\sqrt{a+b\,\text{Cot}[c+d\,x]}}{\sqrt{a+\dot{\imath}\,b}}\right]}{\sqrt{a+\dot{\imath}\,b}}\right)\sqrt{a+b\,\text{Cot}[c+d\,x]}\right)\Big/\left(\sqrt{\text{Csc}[c+d\,x]}\,\sqrt{b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x]}\right)\right)\right)\Big/\left((a-\dot{\imath}\,b)^2\,(a+\dot{\imath}\,b)^2\,d\,(a+b\,\text{Cot}[c+d\,x])^{5/2}\,(-b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])\right)+\left((-a+b\,\text{Cot}[c+d\,x])\,\text{Csc}[c+d\,x]^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^3\left(-\frac{4\,a\,b}{3\,(-\dot{\imath}\,a+b)^2\,(\dot{\imath}\,a+b)^2}+\frac{4\,a\,b^3}{3\,(-\dot{\imath}\,a+b)^2\,(\dot{\imath}\,a+b)^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])^2}-\frac{2\,(-13\,a^2\,b\,\text{Sin}[c+d\,x]+3\,b^3\,\text{Sin}[c+d\,x])}{3\,(-\dot{\imath}\,a+b)^2\,(\dot{\imath}\,a+b)^2\,(b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])}\right)\right)\Big/\left(d\,(a+b\,\text{Cot}[c+d\,x])^{5/2}\,(-b\,\text{Cos}[c+d\,x]+a\,\text{Sin}[c+d\,x])\right)$$

Summary of Integration Test Results

106 integration problems



A - 72 optimal antiderivatives

B - 8 more than twice size of optimal antiderivatives

C - 25 unnecessarily complex antiderivatives

D - 1 unable to integrate problems

E - 0 integration timeouts