Mathematica 11.3 Integration Test Results

Test results for the 385 problems in "5.3.6 Exponentials of inverse tangent.m"

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

$$\int \frac{e^{2 i \text{ArcTan}[a x]}}{x} \, dx$$

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

$$\text{Log}[x] - 2 \text{Log}[i + a x]$$

Result (type 3, 29 leaves):

$$\text{Log}\left[1 - e^{2 i \text{ArcTan}[a x]}\right] + \text{Log}\left[1 + e^{2 i \text{ArcTan}[a x]}\right]$$

Problem 48: Result more than twice size of optimal antiderivative.

$$\int \frac{e^{-2 i \text{ArcTan}[a x]}}{x} \, dx$$

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

$$\text{Log}[x] - 2 \text{Log}[i - a x]$$

Result (type 3, 29 leaves):

$$\text{Log}\left[1 - e^{-2 i \text{ArcTan}[a x]}\right] + \text{Log}\left[1 + e^{-2 i \text{ArcTan}[a x]}\right]$$

Problem 61: Result is not expressed in closed-form.

$$\int e^{\frac{1}{2} i \text{ArcTan}[a x]} x^2 \, dx$$

Optimal (type 3, 339 leaves, 15 steps):

$$-\frac{3 i (1 - i a x)^{3/4} (1 + i a x)^{1/4}}{8 a^3} - \frac{i (1 - i a x)^{3/4} (1 + i a x)^{5/4}}{12 a^3} + \frac{x (1 - i a x)^{3/4} (1 + i a x)^{5/4}}{3 a^2} + \frac{3 i \text{ArcTan}\left[1 - \frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2} a^3} - \frac{3 i \text{ArcTan}\left[1 + \frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2} a^3} - \frac{3 i \text{Log}\left[1 + \frac{\sqrt{1-i a x}}{\sqrt{1+i a x}} - \frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2} a^3} + \frac{3 i \text{Log}\left[1 + \frac{\sqrt{1-i a x}}{\sqrt{1+i a x}} + \frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2} a^3}$$

Result (type 7, 107 leaves):

$$\frac{1}{96 a^3}\left(-\frac{8 i e^{\frac{1}{2} i \text{ArcTan}[a x]}\left(9+6 e^{2 i \text{ArcTan}[a x]}+29 e^{4 i \text{ArcTan}[a x]}\right)}{\left(1+e^{2 i \text{ArcTan}[a x]}\right)^3}+9 \text{RootSum}\left[1+\#1^4\&,\frac{\text{ArcTan}[a x]+2 i \text{Log}\left[e^{\frac{1}{2} i \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\&\right]\right)$$

Problem 63: Result is not expressed in closed-form.

$$\int e^{\frac{1}{2} i \text{ArcTan}[a x]}\, dx$$

Optimal (type 3, 268 leaves, 13 steps):

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

Result (type 7, 79 leaves):

$$-\frac{1}{4 a}\left(-\frac{8 i e^{\frac{1}{2} i \text{ArcTan}[a x]}}{1+e^{2 i \text{ArcTan}[a x]}}+\text{RootSum}\left[1+\#1^4\&,\frac{\text{ArcTan}[a x]+2 i \text{Log}\left[e^{\frac{1}{2} i \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\&\right]\right)$$

Problem 71: Result is not expressed in closed-form.

$$\int e^{\frac{3}{2} i \text{ArcTan}[a x]} x^2\, dx$$

Optimal (type 3, 339 leaves, 15 steps):

$$-\frac{17 i (1-i a x)^{1/4} (1+i a x)^{3/4}}{24 a^3}-\frac{i (1-i a x)^{1/4} (1+i a x)^{7/4}}{4 a^3}+\frac{x (1-i a x)^{1/4} (1+i a x)^{7/4}}{3 a^2}+\frac{17 i \text{ArcTan}\left[1-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2} a^3}-\frac{17 i \text{ArcTan}\left[1+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2} a^3}+\frac{17 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2} a^3}-\frac{17 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2} a^3}$$

Result (type 7, 107 leaves):

$$\frac{1}{96\,a^3}\left(-\frac{8\,i\,e^{\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}\left(17+30\,e^{2\,i\,\text{ArcTan}[a\,x]}+45\,e^{4\,i\,\text{ArcTan}[a\,x]}\right)}{\left(1+e^{2\,i\,\text{ArcTan}[a\,x]}\right)^3}+51\,\text{RootSum}\left[1+\#1^4\,\&,\ \frac{\text{ArcTan}[a\,x]+2\,i\,\text{Log}\left[e^{\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1}\,\&\right]\right)$$

Problem 73: Result is not expressed in closed-form.

$$\int e^{\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}\,dx$$

Optimal (type 3, 268 leaves, 13 steps):

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

Result (type 7, 82 leaves):

$$\frac{2\,i\,e^{\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}}{a\,\left(1+e^{2\,i\,\text{ArcTan}[a\,x]}\right)}-\frac{3\,\text{RootSum}\left[1+\#1^4\,\&,\ \frac{\text{ArcTan}[a\,x]+2\,i\,\text{Log}\left[e^{\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1}\,\&\right]}{4\,a}$$

Problem 80: Result is not expressed in closed-form.

$$\int e^{\frac{5}{2}\,i\,\text{ArcTan}[a\,x]}\,x^2\,dx$$

Optimal (type 3, 371 leaves, 16 steps):

$$\frac{55\,i\,(1-i\,a\,x)^{3/4}\,(1+i\,a\,x)^{1/4}}{8\,a^3}+\frac{11\,i\,(1-i\,a\,x)^{3/4}\,(1+i\,a\,x)^{5/4}}{4\,a^3}+\frac{2\,i\,(1+i\,a\,x)^{9/4}}{a^3\,(1-i\,a\,x)^{1/4}}+\frac{i\,(1-i\,a\,x)^{3/4}\,(1+i\,a\,x)^{9/4}}{3\,a^3}-\frac{55\,i\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{8\,\sqrt{2}\,a^3}+\frac{55\,i\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{8\,\sqrt{2}\,a^3}+\frac{55\,i\,\text{Log}\left[1+\frac{\sqrt{1-i\,a\,x}}{\sqrt{1+i\,a\,x}}-\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{16\,\sqrt{2}\,a^3}-\frac{55\,i\,\text{Log}\left[1+\frac{\sqrt{1-i\,a\,x}}{\sqrt{1+i\,a\,x}}+\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{16\,\sqrt{2}\,a^3}$$

Result (type 7, 120 leaves):

$$\frac{1}{a^3}\left(\left(i\, e^{\frac{1}{2} i \text{ArcTan}[a x]} \left(165+462\, e^{2 i \text{ArcTan}[a x]}+425\, e^{4 i \text{ArcTan}[a x]}+96\, e^{6 i \text{ArcTan}[a x]}\right)\right)\Big/\right.$$
$$\left.\left(12\left(1+e^{2 i \text{ArcTan}[a x]}\right)^3\right)-\frac{55}{32}\text{RootSum}\left[1+\#1^4\&,\frac{\text{ArcTan}[a x]+2 i \text{Log}\left[e^{\frac{1}{2} i \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\&\right]\right)$$

Problem 82: Result is not expressed in closed-form.

$$\int e^{\frac{5}{2} i \text{ArcTan}[a x]}\, dx$$

Optimal (type 3, 299 leaves, 14 steps):

$$-\frac{5 i (1-i a x)^{3/4} (1+i a x)^{1/4}}{a}-\frac{4 i (1+i a x)^{5/4}}{a (1-i a x)^{1/4}}+\frac{5 i \text{ArcTan}\left[1-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{\sqrt{2}\, a}-\frac{5 i \text{ArcTan}\left[1+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{\sqrt{2}\, a}-\frac{5 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{2 \sqrt{2}\, a}+\frac{5 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{2 \sqrt{2}\, a}$$

Result (type 7, 95 leaves):

$$\frac{1}{4 a}\left(-\frac{8 i\, e^{\frac{1}{2} i \text{ArcTan}[a x]} \left(5+4\, e^{2 i \text{ArcTan}[a x]}\right)}{1+e^{2 i \text{ArcTan}[a x]}}+5\,\text{RootSum}\left[1+\#1^4\&,\frac{\text{ArcTan}[a x]+2 i \text{Log}\left[e^{\frac{1}{2} i \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\&\right]\right)$$

Problem 89: Result is not expressed in closed-form.

$$\int e^{-\frac{1}{2} i \text{ArcTan}[a x]}\, x^2\, dx$$

Optimal (type 3, 339 leaves, 15 steps):

$$\frac{3 i (1-i a x)^{1/4} (1+i a x)^{3/4}}{8 a^3}+\frac{i (1-i a x)^{5/4} (1+i a x)^{3/4}}{12 a^3}+\frac{x (1-i a x)^{5/4} (1+i a x)^{3/4}}{3 a^2}+\frac{3 i \text{ArcTan}\left[1-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2}\, a^3}-\frac{3 i \text{ArcTan}\left[1+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2}\, a^3}+\frac{3 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2}\, a^3}-\frac{3 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2}\, a^3}$$

Result (type 7, 107 leaves):

$$\frac{1}{96 a^3}\left(\frac{8 i e^{\frac{3}{2} i \text{ArcTan}[a x]} \left(29+6 e^{2 i \text{ArcTan}[a x]}+9 e^{4 i \text{ArcTan}[a x]}\right)}{\left(1+e^{2 i \text{ArcTan}[a x]}\right)^3}+9 \text{RootSum}\left[1+\#1^4\&, \frac{\text{ArcTan}[a x]-2 i \text{Log}\left[e^{-\frac{1}{2} i \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\&\right]\right)$$

Problem 91: Result is not expressed in closed-form.

$$\int e^{-\frac{1}{2} i \text{ArcTan}[a x]} \, dx$$

Optimal (type 3, 268 leaves, 13 steps):

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

Result (type 7, 81 leaves):

$$\frac{1}{4 a}\left(-\frac{8 i e^{\frac{3}{2} i \text{ArcTan}[a x]}}{1+e^{2 i \text{ArcTan}[a x]}}+\text{RootSum}\left[1+\#1^4\&, \frac{-\text{ArcTan}[a x]+2 i \text{Log}\left[e^{-\frac{1}{2} i \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\&\right]\right)$$

Problem 98: Result is not expressed in closed-form.

$$\int e^{-\frac{3}{2} i \text{ArcTan}[a x]} x^2 \, dx$$

Optimal (type 3, 339 leaves, 15 steps):

$$\frac{17 i (1-i a x)^{3/4} (1+i a x)^{1/4}}{24 a^3}+\frac{i (1-i a x)^{7/4} (1+i a x)^{1/4}}{4 a^3}+\frac{x (1-i a x)^{7/4} (1+i a x)^{1/4}}{3 a^2}+\frac{17 i \text{ArcTan}\left[1-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2} a^3}-\frac{17 i \text{ArcTan}\left[1+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{8 \sqrt{2} a^3}-\frac{17 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2} a^3}+\frac{17 i \text{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{16 \sqrt{2} a^3}$$

Result (type 7, 107 leaves):

$$\frac{1}{96\,a^3}\left(\frac{8\,i\,e^{\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}\left(45+30\,e^{2\,i\,\text{ArcTan}[a\,x]}+17\,e^{4\,i\,\text{ArcTan}[a\,x]}\right)}{\left(1+e^{2\,i\,\text{ArcTan}[a\,x]}\right)^3}+\right.$$
$$\left.51\,\text{RootSum}\left[1+\#1^4\,\&,\,\frac{\text{ArcTan}[a\,x]-2\,i\,\text{Log}\left[e^{-\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1}\,\&\right]\right)$$

Problem 100: Result is not expressed in closed-form.

$$\int e^{-\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}\,dx$$

Optimal (type 3, 268 leaves, 13 steps):

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

Result (type 7, 82 leaves):

$$-\frac{2\,i\,e^{-\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}}{a\left(1+e^{-2\,i\,\text{ArcTan}[a\,x]}\right)}-\frac{3\,\text{RootSum}\left[1+\#1^4\,\&,\,\frac{\text{ArcTan}[a\,x]-2\,i\,\text{Log}\left[e^{-\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1}\,\&\right]}{4\,a}$$

Problem 107: Result is not expressed in closed-form.

$$\int e^{-\frac{5}{2}\,i\,\text{ArcTan}[a\,x]}\,x^2\,dx$$

Optimal (type 3, 371 leaves, 16 steps):

$$-\frac{2\,i\,(1-i\,a\,x)^{9/4}}{a^3\,(1+i\,a\,x)^{1/4}}-\frac{55\,i\,(1-i\,a\,x)^{1/4}\,(1+i\,a\,x)^{3/4}}{8\,a^3}-\frac{11\,i\,(1-i\,a\,x)^{5/4}\,(1+i\,a\,x)^{3/4}}{4\,a^3}-$$
$$\frac{i\,(1-i\,a\,x)^{9/4}\,(1+i\,a\,x)^{3/4}}{3\,a^3}-\frac{55\,i\,\text{ArcTan}\left[1-\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{8\,\sqrt{2}\,a^3}+\frac{55\,i\,\text{ArcTan}\left[1+\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{8\,\sqrt{2}\,a^3}-$$
$$\frac{55\,i\,\text{Log}\left[1+\frac{\sqrt{1-i\,a\,x}}{\sqrt{1+i\,a\,x}}-\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{16\,\sqrt{2}\,a^3}+\frac{55\,i\,\text{Log}\left[1+\frac{\sqrt{1-i\,a\,x}}{\sqrt{1+i\,a\,x}}+\frac{\sqrt{2}\,(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}\right]}{16\,\sqrt{2}\,a^3}$$

Result (type 7, 120 leaves):

$$\frac{1}{a^3}\left(-\left(\left(i\, e^{-\frac{1}{2} i \operatorname{ArcTan}[a x]}\left(96+425\, e^{2 i \operatorname{ArcTan}[a x]}+462\, e^{4 i \operatorname{ArcTan}[a x]}+165\, e^{6 i \operatorname{ArcTan}[a x]}\right)\right)\Big/\left(12\left(1+e^{2 i \operatorname{ArcTan}[a x]}\right)^3\right)\right)-\frac{55}{32}\operatorname{RootSum}\left[1+\#1^4\ \&,\ \frac{\operatorname{ArcTan}[a x]-2 i \operatorname{Log}\left[e^{-\frac{1}{2} i \operatorname{ArcTan}[a x]}-\#1\right]}{\#1^3}\ \&\right]\right)$$

Problem 109: Result is not expressed in closed-form.

$$\int e^{-\frac{5}{2} i \operatorname{ArcTan}[a x]}\, dx$$

Optimal (type 3, 299 leaves, 14 steps):

$$\frac{4 i (1-i a x)^{5/4}}{a (1+i a x)^{1/4}}+\frac{5 i (1-i a x)^{1/4} (1+i a x)^{3/4}}{a}+\frac{5 i \operatorname{ArcTan}\left[1-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{\sqrt{2}\, a}-\frac{5 i \operatorname{ArcTan}\left[1+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{\sqrt{2}\, a}+\frac{5 i \operatorname{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}-\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{2 \sqrt{2}\, a}-\frac{5 i \operatorname{Log}\left[1+\frac{\sqrt{1-i a x}}{\sqrt{1+i a x}}+\frac{\sqrt{2} (1-i a x)^{1/4}}{(1+i a x)^{1/4}}\right]}{2 \sqrt{2}\, a}$$

Result (type 7, 95 leaves):

$$\frac{1}{4 a}\left(\frac{8 i\, e^{-\frac{1}{2} i \operatorname{ArcTan}[a x]}\left(4+5\, e^{2 i \operatorname{ArcTan}[a x]}\right)}{1+e^{2 i \operatorname{ArcTan}[a x]}}+5 \operatorname{RootSum}\left[1+\#1^4\ \&,\ \frac{\operatorname{ArcTan}[a x]-2 i \operatorname{Log}\left[e^{-\frac{1}{2} i \operatorname{ArcTan}[a x]}-\#1\right]}{\#1^3}\ \&\right]\right)$$

Problem 115: Result is not expressed in closed-form.

$$\int e^{\frac{1}{3} i \operatorname{ArcTan}[x]}\, x^2\, dx$$

Optimal (type 3, 319 leaves, 16 steps):

$$-\frac{19}{54}\,i\,(1-i x)^{5/6}(1+i x)^{1/6}-\frac{1}{18}\,i\,(1-i x)^{5/6}(1+i x)^{7/6}+\frac{1}{3}(1-i x)^{5/6}(1+i x)^{7/6}x+\frac{19}{162}\,i\,\text{ArcTan}\left[\sqrt{3}-\frac{2(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]-\frac{19}{162}\,i\,\text{ArcTan}\left[\sqrt{3}+\frac{2(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]-\frac{19}{81}\,i\,\text{ArcTan}\left[\frac{(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]-\frac{19\,i\,\text{Log}\left[1+\frac{(1-i x)^{1/3}}{(1+i x)^{1/3}}-\frac{\sqrt{3}(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]}{108\sqrt{3}}+\frac{19\,i\,\text{Log}\left[1+\frac{(1-i x)^{1/3}}{(1+i x)^{1/3}}+\frac{\sqrt{3}(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]}{108\sqrt{3}}$$

Result (type 7, 156 leaves):

$$\frac{1}{486}\left(-6\,i\left(\frac{3\,e^{\frac{1}{3} i\,\text{ArcTan}[x]}\left(19+8\,e^{2 i\,\text{ArcTan}[x]}+61\,e^{4 i\,\text{ArcTan}[x]}\right)}{\left(1+e^{2 i\,\text{ArcTan}[x]}\right)^3}-19\,\text{ArcTan}\left[e^{\frac{1}{3} i\,\text{ArcTan}[x]}\right]\right)-19\,\text{RootSum}\left[1-\#1^2+\#1^4\,\&,\frac{1}{-\#1+2\,\#1^3}\left(-2\,\text{ArcTan}[x]-6\,i\,\text{Log}\left[e^{\frac{1}{3} i\,\text{ArcTan}[x]}-\#1\right]+\text{ArcTan}[x]\,\#1^2+3\,i\,\text{Log}\left[e^{\frac{1}{3} i\,\text{ArcTan}[x]}-\#1\right]\#1^2\right)\&\right]\right)$$

Problem 117: Result is not expressed in closed-form.

$$\int e^{\frac{1}{3} i\,\text{ArcTan}[x]}\,dx$$

Optimal (type 3, 262 leaves, 14 steps):

$$i\,(1-i x)^{5/6}(1+i x)^{1/6}-\frac{1}{3}\,i\,\text{ArcTan}\left[\sqrt{3}-\frac{2(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]+\frac{1}{3}\,i\,\text{ArcTan}\left[\sqrt{3}+\frac{2(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]+\frac{2}{3}\,i\,\text{ArcTan}\left[\frac{(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]+\frac{i\,\text{Log}\left[1+\frac{(1-i x)^{1/3}}{(1+i x)^{1/3}}-\frac{\sqrt{3}(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]}{2\sqrt{3}}-\frac{i\,\text{Log}\left[1+\frac{(1-i x)^{1/3}}{(1+i x)^{1/3}}+\frac{\sqrt{3}(1-i x)^{1/6}}{(1+i x)^{1/6}}\right]}{2\sqrt{3}}$$

Result (type 7, 133 leaves):

$$\frac{2\,i\,e^{\frac{1}{3} i\,\text{ArcTan}[x]}}{1+e^{2 i\,\text{ArcTan}[x]}}-\frac{2}{3}\,i\,\text{ArcTan}\left[e^{\frac{1}{3} i\,\text{ArcTan}[x]}\right]+\frac{1}{9}\,\text{RootSum}\left[1-\#1^2+\#1^4\,\&,\frac{1}{-\#1+2\,\#1^3}\left(-2\,\text{ArcTan}[x]-6\,i\,\text{Log}\left[e^{\frac{1}{3} i\,\text{ArcTan}[x]}-\#1\right]+\text{ArcTan}[x]\,\#1^2+3\,i\,\text{Log}\left[e^{\frac{1}{3} i\,\text{ArcTan}[x]}-\#1\right]\#1^2\right)\&\right]$$

Problem 122: Result is not expressed in closed-form.

$$\int e^{\frac{2}{3} i\,\text{ArcTan}[x]}\,x^2\,dx$$

Optimal (type 3, 177 leaves, 5 steps):

$$-\frac{11}{27} i (1-i x)^{2/3} (1+i x)^{1/3}-\frac{1}{9} i (1-i x)^{2/3} (1+i x)^{4/3}+\frac{1}{3} (1-i x)^{2/3} (1+i x)^{4/3} x+\frac{22 i \text{ArcTan}\left[\frac{1}{\sqrt{3}}-\frac{2 (1-i x)^{1/3}}{\sqrt{3} (1+i x)^{1/3}}\right]}{27 \sqrt{3}}+\frac{11}{27} i \text{Log}\left[1+\frac{(1-i x)^{1/3}}{(1+i x)^{1/3}}\right]+\frac{11}{81} i \text{Log}[1+i x]$$

Result (type 7, 154 leaves):

$$\frac{2}{243} \left(-\frac{9 i e^{\frac{2}{3} i \text{ArcTan}[x]} \left(11+10 e^{2 i \text{ArcTan}[x]}+35 e^{4 i \text{ArcTan}[x]}\right)}{\left(1+e^{2 i \text{ArcTan}[x]}\right)^3}+22 \text{ArcTan}[x]+33 i \text{Log}\left[1+e^{\frac{2}{3} i \text{ArcTan}[x]}\right]+11 \text{RootSum}\left[1-\#1^2+\#1^4 \&, \frac{1}{-2+\#1^2} \left(\text{ArcTan}[x]+3 i \text{Log}\left[e^{\frac{1}{3} i \text{ArcTan}[x]}-\#1\right]+\text{ArcTan}[x] \#1^2+3 i \text{Log}\left[e^{\frac{1}{3} i \text{ArcTan}[x]}-\#1\right] \#1^2\right) \&\right]\right)$$

Problem 124: Result is not expressed in closed-form.

$$\int e^{\frac{2}{3} i \text{ArcTan}[x]} \, dx$$

Optimal (type 3, 116 leaves, 3 steps):

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

Result (type 7, 134 leaves):

$$\frac{2 i e^{\frac{2}{3} i \text{ArcTan}[x]}}{1+e^{2 i \text{ArcTan}[x]}}-\frac{4 \text{ArcTan}[x]}{9}-\frac{2}{3} i \text{Log}\left[1+e^{\frac{2}{3} i \text{ArcTan}[x]}\right]-\frac{2}{9} \text{RootSum}\left[1-\#1^2+\#1^4 \&, \frac{1}{-2+\#1^2} \left(\text{ArcTan}[x]+3 i \text{Log}\left[e^{\frac{1}{3} i \text{ArcTan}[x]}-\#1\right]+\text{ArcTan}[x] \#1^2+3 i \text{Log}\left[e^{\frac{1}{3} i \text{ArcTan}[x]}-\#1\right] \#1^2\right) \&\right]$$

Problem 128: Result is not expressed in closed-form.

$$\int e^{\frac{1}{4} i \text{ArcTan}[a x]} x^2 \, dx$$

Optimal (type 3, 741 leaves, 27 steps):

$$-\frac{11\,i\,(1-i\,a\,x)^{7/8}\,(1+i\,a\,x)^{1/8}}{32\,a^3}-\frac{i\,(1-i\,a\,x)^{7/8}\,(1+i\,a\,x)^{9/8}}{24\,a^3}+$$

$$\frac{x\,(1-i\,a\,x)^{7/8}\,(1+i\,a\,x)^{9/8}}{3\,a^2}+\frac{11\,i\,\sqrt{2+\sqrt{2}}\,\text{ArcTan}\left[\frac{\sqrt{2-\sqrt{2}}-\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\right]}{128\,a^3}+$$

$$\frac{11\,i\,\sqrt{2-\sqrt{2}}\,\text{ArcTan}\left[\frac{\sqrt{2+\sqrt{2}}-\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\right]}{128\,a^3}-\frac{11\,i\,\sqrt{2+\sqrt{2}}\,\text{ArcTan}\left[\frac{\sqrt{2-\sqrt{2}}+\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\right]}{128\,a^3}-$$

$$\frac{11\,i\,\sqrt{2-\sqrt{2}}\,\text{ArcTan}\left[\frac{\sqrt{2+\sqrt{2}}+\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\right]}{128\,a^3}-\frac{11\,i\,\sqrt{2-\sqrt{2}}\,\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}-\frac{\sqrt{2-\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]}{256\,a^3}+$$

$$\frac{11\,i\,\sqrt{2-\sqrt{2}}\,\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}+\frac{\sqrt{2-\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]}{256\,a^3}-$$

$$\frac{11\,i\,\sqrt{2+\sqrt{2}}\,\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}-\frac{\sqrt{2+\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]}{256\,a^3}+$$

$$\frac{11\,i\,\sqrt{2+\sqrt{2}}\,\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}+\frac{\sqrt{2+\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]}{256\,a^3}$$

Result (type 7, 108 leaves) :

$$\frac{1}{a^3}\left(-\frac{i\,e^{\frac{1}{4}\,i\,\text{ArcTan}[a\,x]}\,\left(33+10\,e^{2\,i\,\text{ArcTan}[a\,x]}+105\,e^{4\,i\,\text{ArcTan}[a\,x]}\right)}{48\,\left(1+e^{2\,i\,\text{ArcTan}[a\,x]}\right)^3}+\frac{11}{512}\,\text{RootSum}\left[1+\#1^8\,\&,\,\frac{\text{ArcTan}[a\,x]+4\,i\,\text{Log}\left[e^{\frac{1}{4}\,i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1^7}\,\&\right]\right)$$

Problem 129: Result is not expressed in closed-form.

$$\int e^{\frac{1}{4}\,i\,\text{ArcTan}[a\,x]}\,x\,dx$$

Optimal (type 3, 689 leaves, 26 steps) :

$$\frac{(1-i a x)^{7/8} (1+i a x)^{1/8}}{8 a^2}+\frac{(1-i a x)^{7/8} (1+i a x)^{9/8}}{2 a^2}-$$

$$\frac{\sqrt{2+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2-\sqrt{2}}-\frac{2 (1-i a x)^{1/8}}{(1+i a x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\right]}{32 a^2}-\frac{\sqrt{2-\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2+\sqrt{2}}-\frac{2 (1-i a x)^{1/8}}{(1+i a x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\right]}{32 a^2}+$$

$$\frac{\sqrt{2+\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2-\sqrt{2}}+\frac{2 (1-i a x)^{1/8}}{(1+i a x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\right]}{32 a^2}+\frac{\sqrt{2-\sqrt{2}}\ \text{ArcTan}\left[\frac{\sqrt{2+\sqrt{2}}+\frac{2 (1-i a x)^{1/8}}{(1+i a x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\right]}{32 a^2}+$$

$$\frac{\sqrt{2-\sqrt{2}}\ \text{Log}\left[1+\frac{(1-i a x)^{1/4}}{(1+i a x)^{1/4}}-\frac{\sqrt{2-\sqrt{2}}\ (1-i a x)^{1/8}}{(1+i a x)^{1/8}}\right]}{64 a^2}-\frac{\sqrt{2-\sqrt{2}}\ \text{Log}\left[1+\frac{(1-i a x)^{1/4}}{(1+i a x)^{1/4}}+\frac{\sqrt{2-\sqrt{2}}\ (1-i a x)^{1/8}}{(1+i a x)^{1/8}}\right]}{64 a^2}+$$

$$\frac{\sqrt{2+\sqrt{2}}\ \text{Log}\left[1+\frac{(1-i a x)^{1/4}}{(1+i a x)^{1/4}}-\frac{\sqrt{2+\sqrt{2}}\ (1-i a x)^{1/8}}{(1+i a x)^{1/8}}\right]}{64 a^2}-\frac{\sqrt{2+\sqrt{2}}\ \text{Log}\left[1+\frac{(1-i a x)^{1/4}}{(1+i a x)^{1/4}}+\frac{\sqrt{2+\sqrt{2}}\ (1-i a x)^{1/8}}{(1+i a x)^{1/8}}\right]}{64 a^2}$$

Result (type 7, 138 leaves):

$$\frac{1}{128 a^2}\left(\frac{32\, e^{\frac{1}{4} i\, \text{ArcTan}[a x]} \left(1+9\, e^{2 i\, \text{ArcTan}[a x]}\right)}{\left(1+e^{2 i\, \text{ArcTan}[a x]}\right)^2}+\right.$$

$$\text{RootSum}\left[-i+\#1^4\ \&,\ \frac{\text{ArcTan}[a x]+4 i\, \text{Log}\left[e^{\frac{1}{4} i\, \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\ \&\right]-$$

$$\left.\text{RootSum}\left[i+\#1^4\ \&,\ \frac{\text{ArcTan}[a x]+4 i\, \text{Log}\left[e^{\frac{1}{4} i\, \text{ArcTan}[a x]}-\#1\right]}{\#1^3}\ \&\right]\right)$$

Problem 130: Result is not expressed in closed-form.

$$\int e^{\frac{1}{4} i\, \text{ArcTan}[a x]}\, dx$$

Optimal (type 3, 674 leaves, 25 steps):

$$\frac{i\,(1-i\,a\,x)^{7/8}\,(1+i\,a\,x)^{1/8}}{a}-\frac{i\sqrt{2+\sqrt{2}}\ \text{ArcTan}\Big[\frac{\sqrt{2-\sqrt{2}}-\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\Big]}{4\,a}-$$

$$\frac{i\sqrt{2-\sqrt{2}}\ \text{ArcTan}\Big[\frac{\sqrt{2+\sqrt{2}}-\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\Big]}{4\,a}+\frac{i\sqrt{2+\sqrt{2}}\ \text{ArcTan}\Big[\frac{\sqrt{2-\sqrt{2}}+\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\Big]}{4\,a}+$$

$$\frac{i\sqrt{2-\sqrt{2}}\ \text{ArcTan}\Big[\frac{\sqrt{2+\sqrt{2}}+\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\Big]}{4\,a}+\frac{i\sqrt{2-\sqrt{2}}\ \text{Log}\Big[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}-\frac{\sqrt{2-\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\Big]}{8\,a}-$$

$$\frac{i\sqrt{2-\sqrt{2}}\ \text{Log}\Big[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}+\frac{\sqrt{2-\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\Big]}{8\,a}+$$

$$\frac{i\sqrt{2+\sqrt{2}}\ \text{Log}\Big[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}-\frac{\sqrt{2+\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\Big]}{8\,a}-$$

$$\frac{i\sqrt{2+\sqrt{2}}\ \text{Log}\Big[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}+\frac{\sqrt{2+\sqrt{2}}\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\Big]}{8\,a}$$

Result (type 7, 79 leaves):

$$-\frac{1}{16\,a}\left(-\frac{32\,i\,e^{\frac{1}{4}\,i\,\text{ArcTan}[a\,x]}}{1+e^{2\,i\,\text{ArcTan}[a\,x]}}+\text{RootSum}\Big[1+\#1^8\,\&,\ \frac{\text{ArcTan}[a\,x]+4\,i\,\text{Log}\Big[e^{\frac{1}{4}\,i\,\text{ArcTan}[a\,x]}-\#1\Big]}{\#1^7}\,\&\Big]\right)$$

Problem 131: Result is not expressed in closed-form.

$$\int \frac{e^{\frac{1}{4}\,i\,\text{ArcTan}[a\,x]}}{x}\,dx$$

Optimal (type 3, 859 leaves, 39 steps):

$$-2\,\text{ArcTan}\left[\frac{(1+i\,a\,x)^{1/8}}{(1-i\,a\,x)^{1/8}}\right]+\sqrt{2+\sqrt{2}}\;\text{ArcTan}\left[\frac{\sqrt{2-\sqrt{2}}-\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\right]+$$

$$\sqrt{2-\sqrt{2}}\;\text{ArcTan}\left[\frac{\sqrt{2+\sqrt{2}}-\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\right]-\sqrt{2+\sqrt{2}}\;\text{ArcTan}\left[\frac{\sqrt{2-\sqrt{2}}+\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2+\sqrt{2}}}\right]-$$

$$\sqrt{2-\sqrt{2}}\;\text{ArcTan}\left[\frac{\sqrt{2+\sqrt{2}}+\frac{2\,(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}}{\sqrt{2-\sqrt{2}}}\right]+\sqrt{2}\;\text{ArcTan}\left[1-\frac{\sqrt{2}\;(1+i\,a\,x)^{1/8}}{(1-i\,a\,x)^{1/8}}\right]-$$

$$\sqrt{2}\;\text{ArcTan}\left[1+\frac{\sqrt{2}\;(1+i\,a\,x)^{1/8}}{(1-i\,a\,x)^{1/8}}\right]-2\,\text{ArcTanh}\left[\frac{(1+i\,a\,x)^{1/8}}{(1-i\,a\,x)^{1/8}}\right]-$$

$$\frac{1}{2}\sqrt{2-\sqrt{2}}\;\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}-\frac{\sqrt{2-\sqrt{2}}\;(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]+$$

$$\frac{1}{2}\sqrt{2-\sqrt{2}}\;\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}+\frac{\sqrt{2-\sqrt{2}}\;(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]-$$

$$\frac{1}{2}\sqrt{2+\sqrt{2}}\;\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}-\frac{\sqrt{2+\sqrt{2}}\;(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]+$$

$$\frac{1}{2}\sqrt{2+\sqrt{2}}\;\text{Log}\left[1+\frac{(1-i\,a\,x)^{1/4}}{(1+i\,a\,x)^{1/4}}+\frac{\sqrt{2+\sqrt{2}}\;(1-i\,a\,x)^{1/8}}{(1+i\,a\,x)^{1/8}}\right]+$$

$$\frac{\text{Log}\left[1-\frac{\sqrt{2}\;(1+i\,a\,x)^{1/8}}{(1-i\,a\,x)^{1/8}}+\frac{(1+i\,a\,x)^{1/4}}{(1-i\,a\,x)^{1/4}}\right]}{\sqrt{2}}-\frac{\text{Log}\left[1+\frac{\sqrt{2}\;(1+i\,a\,x)^{1/8}}{(1-i\,a\,x)^{1/8}}+\frac{(1+i\,a\,x)^{1/4}}{(1-i\,a\,x)^{1/4}}\right]}{\sqrt{2}}$$

Result (type 7, 252 leaves) :

$$-2\,\text{ArcTan}\left[e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]+\text{Log}\left[1-e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]+(-1)^{1/4}\,\text{Log}\left[(-1)^{1/4}-e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]+$$

$$(-1)^{3/4}\,\text{Log}\left[(-1)^{3/4}-e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]-\text{Log}\left[1+e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]-$$

$$(-1)^{1/4}\,\text{Log}\left[(-1)^{1/4}+e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]-(-1)^{3/4}\,\text{Log}\left[(-1)^{3/4}+e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}\right]+$$

$$\frac{1}{4}\,\text{RootSum}\left[-i+\#1^4\,\&,\;\frac{-\text{ArcTan}[a\,x]-4\,i\,\text{Log}\left[e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1^3}\,\&\right]+$$

$$\frac{1}{4}\,\text{RootSum}\left[i+\#1^4\,\&,\;\frac{\text{ArcTan}[a\,x]+4\,i\,\text{Log}\left[e^{\frac{1}{4}i\,\text{ArcTan}[a\,x]}-\#1\right]}{\#1^3}\,\&\right]$$

Problem 132: Result is not expressed in closed-form.

$$\int \frac{e^{\frac{1}{4} i \operatorname{ArcTan}[a x]}}{x^2} \, dx$$

Optimal (type 3, 328 leaves, 16 steps):

$$-\frac{(1-i a x)^{7/8} (1+i a x)^{1/8}}{x} - \frac{1}{2} i a \operatorname{ArcTan}\left[\frac{(1+i a x)^{1/8}}{(1-i a x)^{1/8}}\right] + \frac{i a \operatorname{ArcTan}\left[1-\frac{\sqrt{2} (1+i a x)^{1/8}}{(1-i a x)^{1/8}}\right]}{2 \sqrt{2}} - \frac{i a \operatorname{ArcTan}\left[1+\frac{\sqrt{2} (1+i a x)^{1/8}}{(1-i a x)^{1/8}}\right]}{2 \sqrt{2}} - \frac{1}{2} i a \operatorname{ArcTanh}\left[\frac{(1+i a x)^{1/8}}{(1-i a x)^{1/8}}\right] + \frac{i a \operatorname{Log}\left[1-\frac{\sqrt{2} (1+i a x)^{1/8}}{(1-i a x)^{1/8}}+\frac{(1+i a x)^{1/4}}{(1-i a x)^{1/4}}\right]}{4 \sqrt{2}} - \frac{i a \operatorname{Log}\left[1+\frac{\sqrt{2} (1+i a x)^{1/8}}{(1-i a x)^{1/8}}+\frac{(1+i a x)^{1/4}}{(1-i a x)^{1/4}}\right]}{4 \sqrt{2}}$$

Result (type 7, 131 leaves):

$$\frac{1}{16} a \left(-4 i \left(\frac{8 e^{\frac{1}{4} i \operatorname{ArcTan}[a x]}}{-1+e^{2 i \operatorname{ArcTan}[a x]}} + 2 \operatorname{ArcTan}\left[e^{\frac{1}{4} i \operatorname{ArcTan}[a x]}\right] - \operatorname{Log}\left[1-e^{\frac{1}{4} i \operatorname{ArcTan}[a x]}\right] + \operatorname{Log}\left[1+e^{\frac{1}{4} i \operatorname{ArcTan}[a x]}\right]\right) - \operatorname{RootSum}\left[1+\#1^4 \&, \frac{\operatorname{ArcTan}[a x] + 4 i \operatorname{Log}\left[e^{\frac{1}{4} i \operatorname{ArcTan}[a x]} - \#1\right]}{\#1^3} \&\right]\right)$$

Problem 140: Result unnecessarily involves higher level functions.

$$\int e^{3 i \operatorname{ArcTan}[a x]} x^m \, dx$$

Optimal (type 5, 159 leaves, 9 steps):

$$-\frac{3 x^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{1+m}{2}, \frac{3+m}{2}, -a^2 x^2\right]}{1+m} - \frac{i a x^{2+m} \operatorname{Hypergeometric2F1}\left[\frac{1}{2}, \frac{2+m}{2}, \frac{4+m}{2}, -a^2 x^2\right]}{2+m} + \frac{4 x^{1+m} \operatorname{Hypergeometric2F1}\left[\frac{3}{2}, \frac{1+m}{2}, \frac{3+m}{2}, -a^2 x^2\right]}{1+m} + \frac{4 i a x^{2+m} \operatorname{Hypergeometric2F1}\left[\frac{3}{2}, \frac{2+m}{2}, \frac{4+m}{2}, -a^2 x^2\right]}{2+m}$$

Result (type 6, 315 leaves):

$$\left(2\,(2+m)\,x^{1+m}\,\sqrt{-i+a\,x}\right.$$
$$\left(-\left(\left(2\,\text{AppellF1}\left[1+m,-\frac{1}{2},\frac{3}{2},2+m,-i\,a\,x,i\,a\,x\right]\right)\Big/\left(2\,(2+m)\,\text{AppellF1}\left[1+m,-\frac{1}{2},\frac{3}{2},\right.\right.\right.\right.$$
$$2+m,-i\,a\,x,i\,a\,x\Big]+i\,a\,x\left(3\,\text{AppellF1}\left[2+m,-\frac{1}{2},\frac{5}{2},3+m,-i\,a\,x,i\,a\,x\right]+\right.$$
$$\left.\left.\left.\text{AppellF1}\left[2+m,\frac{1}{2},\frac{3}{2},3+m,-i\,a\,x,i\,a\,x\right]\right)\right)\right)-$$
$$\left(i\,\sqrt{1-i\,a\,x}\,\sqrt{1+a^2\,x^2}\,\text{AppellF1}\left[1+m,-\frac{1}{2},\frac{1}{2},2+m,-i\,a\,x,i\,a\,x\right]\right)\Big/$$
$$\left(\sqrt{1+i\,a\,x}\,\left(-2\,i\,(2+m)\,\text{AppellF1}\left[1+m,-\frac{1}{2},\frac{1}{2},2+m,-i\,a\,x,i\,a\,x\right]+\right.\right.$$
$$a\,x\left(\text{AppellF1}\left[2+m,-\frac{1}{2},\frac{3}{2},3+m,-i\,a\,x,i\,a\,x\right]+\right.$$
$$\left.\left.\left.\left.\left.\text{HypergeometricPFQ}\left[\left\{\frac{1}{2},1+\frac{m}{2}\right\},\left\{2+\frac{m}{2}\right\},-a^2\,x^2\right]\right)\right)\right)\right)\right)\Big/\left((1+m)\,(i+a\,x)^{3/2}\right)$$

Problem 141: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int e^{i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 5, 79 leaves, 4 steps):

$$\frac{x^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},-a^2\,x^2\right]}{1+m}+\frac{i\,a\,x^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},-a^2\,x^2\right]}{2+m}$$

Result (type 6, 193 leaves):

$$\left(2\,i\,(2+m)\,x^{1+m}\,\sqrt{1-i\,a\,x}\,\sqrt{-i+a\,x}\,\sqrt{1+a^2\,x^2}\,\text{AppellF1}\left[1+m,-\frac{1}{2},\frac{1}{2},2+m,-i\,a\,x,i\,a\,x\right]\right)\Big/$$
$$\left((1+m)\,\sqrt{1+i\,a\,x}\,(i+a\,x)^{3/2}\right.$$
$$\left(-2\,i\,(2+m)\,\text{AppellF1}\left[1+m,-\frac{1}{2},\frac{1}{2},2+m,-i\,a\,x,i\,a\,x\right]+a\,x\left(\text{AppellF1}\left[2+m,-\frac{1}{2},\right.\right.\right.$$
$$\left.\left.\left.\left.\frac{3}{2},3+m,-i\,a\,x,i\,a\,x\right]+\text{HypergeometricPFQ}\left[\left\{\frac{1}{2},1+\frac{m}{2}\right\},\left\{2+\frac{m}{2}\right\},-a^2\,x^2\right]\right)\right)\right)$$

Problem 142: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int e^{-i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 5, 79 leaves, 4 steps):

$$\frac{x^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},-a^2\,x^2\right]}{1+m}-\frac{i\,a\,x^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},-a^2\,x^2\right]}{2+m}$$

Result (type 6, 193 leaves):

$$-\left(\left(2\,\mathrm{i}\,(2+m)\,x^{1+m}\sqrt{1+\mathrm{i}\,a\,x}\,\sqrt{\mathrm{i}+a\,x}\,\sqrt{1+a^2x^2}\,\text{AppellF1}\left[1+m,\frac{1}{2},-\frac{1}{2},2+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]\right)\Big/\left((1+m)\sqrt{1-\mathrm{i}\,a\,x}\,(-\mathrm{i}+a\,x)^{3/2}\left(2\,\mathrm{i}\,(2+m)\,\text{AppellF1}\left[1+m,\frac{1}{2},-\frac{1}{2},2+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]+a\,x\left(\text{AppellF1}\left[2+m,\frac{3}{2},-\frac{1}{2},3+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]+\text{HypergeometricPFQ}\left[\left\{\frac{1}{2},1+\frac{m}{2}\right\},\left\{2+\frac{m}{2}\right\},-a^2x^2\right]\right)\right)\right)\right)$$

Problem 143: Result unnecessarily involves higher level functions.

$$\int e^{-3\,\mathrm{i}\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 5, 159 leaves, 9 steps):

$$-\frac{3\,x^{1+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{1+m}{2},\frac{3+m}{2},-a^2x^2\right]}{1+m}+\frac{\mathrm{i}\,a\,x^{2+m}\,\text{Hypergeometric2F1}\left[\frac{1}{2},\frac{2+m}{2},\frac{4+m}{2},-a^2x^2\right]}{2+m}+\frac{4\,x^{1+m}\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{1+m}{2},\frac{3+m}{2},-a^2x^2\right]}{1+m}-\frac{4\,\mathrm{i}\,a\,x^{2+m}\,\text{Hypergeometric2F1}\left[\frac{3}{2},\frac{2+m}{2},\frac{4+m}{2},-a^2x^2\right]}{2+m}$$

Result (type 6, 315 leaves):

$$\left(2\,(2+m)\,x^{1+m}\sqrt{\mathrm{i}+a\,x}\left(-\left(\left(2\,\text{AppellF1}\left[1+m,\frac{3}{2},-\frac{1}{2},2+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]\right)\Big/\left(2\,(2+m)\,\text{AppellF1}\left[1+m,\frac{3}{2},-\frac{1}{2},2+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]-\mathrm{i}\,a\,x\left(\text{AppellF1}\left[2+m,\frac{3}{2},\frac{1}{2},3+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]+3\,\text{AppellF1}\left[2+m,\frac{5}{2},-\frac{1}{2},3+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]\right)\right)\right)+\left(\mathrm{i}\sqrt{1+\mathrm{i}\,a\,x}\,\sqrt{1+a^2x^2}\,\text{AppellF1}\left[1+m,\frac{1}{2},-\frac{1}{2},2+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]\right)\Big/\left(\sqrt{1-\mathrm{i}\,a\,x}\left(2\,\mathrm{i}\,(2+m)\,\text{AppellF1}\left[1+m,\frac{1}{2},-\frac{1}{2},2+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]+a\,x\left(\text{AppellF1}\left[2+m,\frac{3}{2},-\frac{1}{2},3+m,-\mathrm{i}\,a\,x,\mathrm{i}\,a\,x\right]+\text{HypergeometricPFQ}\left[\left\{\frac{1}{2},1+\frac{m}{2}\right\},\left\{2+\frac{m}{2}\right\},-a^2x^2\right]\right)\right)\right)\right)\right)\Big/\left((1+m)\,(-\mathrm{i}+a\,x)^{3/2}\right)$$

Problem 144: Unable to integrate problem.

$$\int e^{\frac{5}{2}\,\mathrm{i}\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m}\,\text{AppellF1}\left[1+m,\frac{5}{4},-\frac{5}{4},2+m,\,i\,a\,x,\,-i\,a\,x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{\frac{5}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Problem 145: Unable to integrate problem.

$$\int e^{\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m}\,\text{AppellF1}\left[1+m,\frac{3}{4},-\frac{3}{4},2+m,\,i\,a\,x,\,-i\,a\,x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{\frac{3}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Problem 146: Unable to integrate problem.

$$\int e^{\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m}\,\text{AppellF1}\left[1+m,\frac{1}{4},-\frac{1}{4},2+m,\,i\,a\,x,\,-i\,a\,x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Problem 147: Unable to integrate problem.

$$\int e^{-\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m}\,\text{AppellF1}\left[1+m,-\frac{1}{4},\frac{1}{4},2+m,\,i\,a\,x,\,-i\,a\,x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{-\frac{1}{2}\,i\,\text{ArcTan}[a\,x]}\,x^m\,dx$$

Problem 148: Unable to integrate problem.

$$\int e^{-\frac{3}{2} i \text{ArcTan}[a x]} x^m \, dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, -\frac{3}{4}, \frac{3}{4}, 2+m, i a x, -i a x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{-\frac{3}{2} i \text{ArcTan}[a x]} x^m \, dx$$

Problem 149: Unable to integrate problem.

$$\int e^{-\frac{5}{2} i \text{ArcTan}[a x]} x^m \, dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, -\frac{5}{4}, \frac{5}{4}, 2+m, i a x, -i a x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{-\frac{5}{2} i \text{ArcTan}[a x]} x^m \, dx$$

Problem 150: Unable to integrate problem.

$$\int e^{\frac{2 \text{ArcTan}[x]}{3}} x^m \, dx$$

Optimal (type 6, 38 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, -\frac{i}{3}, \frac{i}{3}, 2+m, i x, -i x\right]}{1+m}$$

Result (type 8, 14 leaves):

$$\int e^{\frac{2 \text{ArcTan}[x]}{3}} x^m \, dx$$

Problem 151: Unable to integrate problem.

$$\int e^{\frac{\text{ArcTan}[x]}{3}} x^m \, dx$$

Optimal (type 6, 38 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, -\frac{i}{6}, \frac{i}{6}, 2+m, i x, -i x\right]}{1+m}$$

Result (type 8, 14 leaves):

$$\int e^{\frac{\text{ArcTan}[x]}{3}} x^m \, dx$$

Problem 152: Unable to integrate problem.

$$\int e^{\frac{1}{4} i \text{ArcTan}[a x]} x^m \, dx$$

Optimal (type 6, 36 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, \frac{1}{8}, -\frac{1}{8}, 2+m, i a x, -i a x\right]}{1+m}$$

Result (type 8, 18 leaves):

$$\int e^{\frac{1}{4} i \text{ArcTan}[a x]} x^m \, dx$$

Problem 153: Unable to integrate problem.

$$\int e^{i n \text{ArcTan}[a x]} x^m \, dx$$

Optimal (type 6, 40 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, \frac{n}{2}, -\frac{n}{2}, 2+m, i a x, -i a x\right]}{1+m}$$

Result (type 8, 17 leaves):

$$\int e^{i n \text{ArcTan}[a x]} x^m \, dx$$

Problem 176: Result more than twice size of optimal antiderivative.

$$\int \frac{e^{2 i \text{ArcTan}[a+b x]}}{x} \, dx$$

Optimal (type 3, 38 leaves, 3 steps):

$$\frac{(i - a) \text{Log}[x]}{i + a} - \frac{2 \text{Log}[i + a + b x]}{1 - i a}$$

Result (type 3, 125 leaves):

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

Problem 203: Result more than twice size of optimal antiderivative.

$$\int \frac{e^{-2\,i\,\text{ArcTan}[a+b\,x]}}{x}\,dx$$

Optimal (type 3, 41 leaves, 3 steps):

$$\frac{(i+a)\,\text{Log}[x]}{i-a}-\frac{2\,\text{Log}[i-a-b\,x]}{1+i\,a}$$

Result (type 3, 138 leaves):

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

Problem 218: Result is not expressed in closed-form.

$$\int e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}\,dx$$

Optimal (type 3, 338 leaves, 13 steps):

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

Result (type 7, 87 leaves):

$$-\frac{1}{4\,b}\left(-\frac{8\,i\,e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}}{1+e^{2\,i\,\text{ArcTan}[a+b\,x]}}+\text{RootSum}\left[1+\#1^4\,\&,\,\frac{\text{ArcTan}[a+b\,x]+2\,i\,\text{Log}\left[e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}-\#1\right]}{\#1^3}\,\&\right]\right)$$

Problem 219: Result is not expressed in closed-form.

$$\int \frac{e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}}{x}\,dx$$

Optimal (type 3, 395 leaves, 15 steps):

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

Result (type 7, 184 leaves):

$$(-1)^{1/4}\left(-\mathrm{Log}\left[(-1)^{1/4}-e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right]-\mathrm{i}\,\mathrm{Log}\left[(-1)^{3/4}-e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right]+\right.$$
$$\left.\mathrm{Log}\left[(-1)^{1/4}+e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right]+\mathrm{i}\,\mathrm{Log}\left[(-1)^{3/4}+e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right]\right)+\frac{1}{2\,(\mathrm{i}+a)}$$
$$(1+\mathrm{i}\,a)\,\mathrm{RootSum}\left[-\mathrm{i}+a+\mathrm{i}\,\#1^4+a\,\#1^4\,\&,\ \frac{\mathrm{ArcTan}[a+b\,x]+\mathrm{i}\,\mathrm{Log}\left[\left(e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}-\#1\right)^2\right]}{\#1^3}\,\&\right]$$

Problem 220: Result is not expressed in closed-form.

$$\int\frac{e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}}{x^2}\,dx$$

Optimal (type 3, 205 leaves, 6 steps):

$$-\frac{(\mathrm{i}+a+b\,x)\,(1+\mathrm{i}\,(a+b\,x))^{1/4}}{(\mathrm{i}+a)\,x\,(1-\mathrm{i}\,(a+b\,x))^{1/4}}+$$
$$\frac{\mathrm{i}\,b\,\mathrm{ArcTan}\left[\frac{(\mathrm{i}+a)^{1/4}\,(1+\mathrm{i}\,(a+b\,x))^{1/4}}{(\mathrm{i}-a)^{1/4}\,(1-\mathrm{i}\,(a+b\,x))^{1/4}}\right]}{(\mathrm{i}-a)^{3/4}\,(\mathrm{i}+a)^{5/4}}+\frac{\mathrm{i}\,b\,\mathrm{ArcTanh}\left[\frac{(\mathrm{i}+a)^{1/4}\,(1+\mathrm{i}\,(a+b\,x))^{1/4}}{(\mathrm{i}-a)^{1/4}\,(1-\mathrm{i}\,(a+b\,x))^{1/4}}\right]}{(\mathrm{i}-a)^{3/4}\,(\mathrm{i}+a)^{5/4}}$$

Result (type 7, 131 leaves):

$$-\frac{1}{4\,(\mathrm{i}+a)^2}b\left(\frac{8\,(\mathrm{i}+a)\,e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}}{1-e^{2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}+\mathrm{i}\,a\,\left(1+e^{2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right)}+\right.$$
$$\left.\mathrm{RootSum}\left[-\mathrm{i}+a+\mathrm{i}\,\#1^4+a\,\#1^4\,\&,\ \frac{\mathrm{ArcTan}[a+b\,x]+\mathrm{i}\,\mathrm{Log}\left[\left(e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}-\#1\right)^2\right]}{\#1^3}\,\&\right]\right)$$

Problem 223: Result is not expressed in closed-form.

$$\int e^{\frac{3}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\,dx$$

Optimal (type 3, 338 leaves, 13 steps):

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

Result (type 7, 90 leaves):

$$\frac{2\,i\,e^{\frac{3}{2} i\,\text{ArcTan}[a+b x]}}{b\left(1+e^{2 i\,\text{ArcTan}[a+b x]}\right)}-\frac{3\,\text{RootSum}\left[1+\#1^4\,\&,\ \frac{\text{ArcTan}[a+b x]+2\,i\,\text{Log}\left[e^{\frac{1}{2} i\,\text{ArcTan}[a+b x]}-\#1\right]}{\#1}\,\&\right]}{4\,b}$$

Problem 224: Result is not expressed in closed-form.

$$\int \frac{e^{\frac{3}{2} i\,\text{ArcTan}[a+b x]}}{x}\,dx$$

Optimal (type 3, 427 leaves, 18 steps):

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

Result (type 7, 184 leaves):

$$(-1)^{1/4}\left(-i\,\text{Log}\left[(-1)^{1/4}-e^{\frac{1}{2} i\,\text{ArcTan}[a+b x]}\right]-\text{Log}\left[(-1)^{3/4}-e^{\frac{1}{2} i\,\text{ArcTan}[a+b x]}\right]+i\,\text{Log}\left[(-1)^{1/4}+e^{\frac{1}{2} i\,\text{ArcTan}[a+b x]}\right]+\text{Log}\left[(-1)^{3/4}+e^{\frac{1}{2} i\,\text{ArcTan}[a+b x]}\right]\right)+\frac{1}{2\,(i+a)}(1+i a)\,\text{RootSum}\left[-i+a+i\,\#1^4+a\,\#1^4\,\&,\ \frac{\text{ArcTan}[a+b x]+i\,\text{Log}\left[\left(e^{\frac{1}{2} i\,\text{ArcTan}[a+b x]}-\#1\right)^2\right]}{\#1}\,\&\right]$$

Problem 225: Result is not expressed in closed-form.

$$\int \frac{e^{\frac{3}{2} i\,\text{ArcTan}[a+b x]}}{x^2}\,dx$$

Optimal (type 3, 211 leaves, 6 steps):

$$-\frac{(1-i a-i b x)^{1/4}(1+i a+i b x)^{3/4}}{(1-i a) x}-\frac{3 i b \operatorname{ArcTan}\left[\frac{(i+a)^{1/4}(1+i a+i b x)^{1/4}}{(i-a)^{1/4}(1-i a-i b x)^{1/4}}\right]}{(i-a)^{1/4}(i+a)^{7/4}}+\frac{3 i b \operatorname{ArcTanh}\left[\frac{(i+a)^{1/4}(1+i a+i b x)^{1/4}}{(i-a)^{1/4}(1-i a-i b x)^{1/4}}\right]}{(i-a)^{1/4}(i+a)^{7/4}}$$

Result (type 7, 131 leaves):

$$\frac{1}{4(i+a)^2} b\left(\frac{8(i+a) e^{\frac{3}{2} i \operatorname{ArcTan}[a+b x]}}{-1+e^{2 i \operatorname{ArcTan}[a+b x]}-i a\left(1+e^{2 i \operatorname{ArcTan}[a+b x]}\right)}-3 \operatorname{RootSum}\left[-i+a+i \#1^4+a \#1^4 \&, \frac{\operatorname{ArcTan}[a+b x]+i \operatorname{Log}\left[\left(e^{\frac{1}{2} i \operatorname{ArcTan}[a+b x]}-\#1\right)^2\right]}{\#1} \&\right]\right)$$

Problem 228: Result is not expressed in closed-form.

$$\int e^{-\frac{1}{2} i \operatorname{ArcTan}[a+b x]} \, dx$$

Optimal (type 3, 338 leaves, 13 steps):

$$-\frac{i(1-i a-i b x)^{1/4}(1+i a+i b x)^{3/4}}{b}-\frac{i \operatorname{ArcTan}\left[1-\frac{\sqrt{2}(1-i a-i b x)^{1/4}}{(1+i a+i b x)^{1/4}}\right]}{\sqrt{2} b}+\frac{i \operatorname{ArcTan}\left[1+\frac{\sqrt{2}(1-i a-i b x)^{1/4}}{(1+i a+i b x)^{1/4}}\right]}{\sqrt{2} b}-\frac{i \operatorname{Log}\left[1+\frac{\sqrt{1-i a-i b x}}{\sqrt{1+i a+i b x}}-\frac{\sqrt{2}(1-i a-i b x)^{1/4}}{(1+i a+i b x)^{1/4}}\right]}{2 \sqrt{2} b}+\frac{i \operatorname{Log}\left[1+\frac{\sqrt{1-i a-i b x}}{\sqrt{1+i a+i b x}}+\frac{\sqrt{2}(1-i a-i b x)^{1/4}}{(1+i a+i b x)^{1/4}}\right]}{2 \sqrt{2} b}$$

Result (type 7, 89 leaves):

$$\frac{1}{4 b}\left(-\frac{8 i e^{\frac{3}{2} i \operatorname{ArcTan}[a+b x]}}{1+e^{2 i \operatorname{ArcTan}[a+b x]}}+\operatorname{RootSum}\left[1+\#1^4 \&, \frac{-\operatorname{ArcTan}[a+b x]+2 i \operatorname{Log}\left[e^{-\frac{1}{2} i \operatorname{ArcTan}[a+b x]}-\#1\right]}{\#1^3} \&\right]\right)$$

Problem 229: Result is not expressed in closed-form.

$$\int \frac{e^{-\frac{1}{2} i \operatorname{ArcTan}[a+b x]}}{x} \, dx$$

Optimal (type 3, 395 leaves, 14 steps):

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

Result (type 7, 236 leaves):

$$(-1)^{1/4}\left(\mathrm{i}\,\mathrm{Log}\left[e^{-2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\left((-1)^{1/4}-e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right)\right]+\right.$$
$$\mathrm{Log}\left[e^{-2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\left((-1)^{3/4}-e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right)\right]-$$
$$\mathrm{i}\,\mathrm{Log}\left[e^{-2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\left((-1)^{1/4}+e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right)\right]-$$
$$\left.\mathrm{Log}\left[e^{-2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\left((-1)^{3/4}+e^{\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right)\right]\right)+\frac{1}{2\,(-\mathrm{i}+a)}$$
$$(1-\mathrm{i}\,a)\,\mathrm{RootSum}\left[\mathrm{i}+a-\mathrm{i}\,\#1^4+a\,\#1^4\,\&,\,\frac{\mathrm{ArcTan}[a+b\,x]-\mathrm{i}\,\mathrm{Log}\left[\left(e^{-\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}-\#1\right)^2\right]}{\#1^3}\,\&\right]$$

Problem 230: Result is not expressed in closed-form.

$$\int\frac{e^{-\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}}{x^2}\,dx$$

Optimal (type 3, 210 leaves, 5 steps):

$$-\frac{(\mathrm{i}-a-b\,x)\,(1-\mathrm{i}\,(a+b\,x))^{1/4}}{(\mathrm{i}-a)\,x\,(1+\mathrm{i}\,(a+b\,x))^{1/4}}-$$
$$\frac{\mathrm{i}\,b\,\mathrm{ArcTan}\left[\frac{(\mathrm{i}-a)^{1/4}\,(1-\mathrm{i}\,(a+b\,x))^{1/4}}{(\mathrm{i}+a)^{1/4}\,(1+\mathrm{i}\,(a+b\,x))^{1/4}}\right]}{(\mathrm{i}-a)^{5/4}\,(\mathrm{i}+a)^{3/4}}-\frac{\mathrm{i}\,b\,\mathrm{ArcTanh}\left[\frac{(\mathrm{i}-a)^{1/4}\,(1-\mathrm{i}\,(a+b\,x))^{1/4}}{(\mathrm{i}+a)^{1/4}\,(1+\mathrm{i}\,(a+b\,x))^{1/4}}\right]}{(\mathrm{i}-a)^{5/4}\,(\mathrm{i}+a)^{3/4}}$$

Result (type 7, 133 leaves):

$$\frac{1}{4\,(-\mathrm{i}+a)^2}b\left(\frac{8\,(-\mathrm{i}+a)\,e^{\frac{3}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}}{1-e^{2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}+\mathrm{i}\,a\,\left(1+e^{2\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}\right)}+\right.$$
$$\left.\mathrm{RootSum}\left[\mathrm{i}+a-\mathrm{i}\,\#1^4+a\,\#1^4\,\&,\,\frac{-\mathrm{ArcTan}[a+b\,x]+\mathrm{i}\,\mathrm{Log}\left[\left(e^{-\frac{1}{2}\,\mathrm{i}\,\mathrm{ArcTan}[a+b\,x]}-\#1\right)^2\right]}{\#1^3}\,\&\right]\right)$$

Problem 233: Result is not expressed in closed-form.

$$\int e^{-\frac{3}{2} i \,\text{ArcTan}[a+b x]} \, dx$$

Optimal (type 3, 338 leaves, 13 steps):

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

Result (type 7, 90 leaves):

$$-\frac{2 i e^{-\frac{3}{2} i \,\text{ArcTan}[a+b x]}}{b \left(1+e^{-2 i \,\text{ArcTan}[a+b x]}\right)}-\frac{3 \,\text{RootSum}\left[1+\#1^4 \&, \frac{\text{ArcTan}[a+b x]-2 i \,\text{Log}\left[e^{-\frac{1}{2} i \,\text{ArcTan}[a+b x]}-\#1\right]}{\#1} \&\right]}{4 b}$$

Problem 234: Result is not expressed in closed-form.

$$\int \frac{e^{-\frac{3}{2} i \,\text{ArcTan}[a+b x]}}{x} \, dx$$

Optimal (type 3, 427 leaves, 18 steps):

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

Result (type 7, 237 leaves):

$$(-1)^{1/4}\left(\text{Log}\left[e^{-2\,i\,\text{ArcTan}[a+b\,x]}\left((-1)^{1/4}-e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}\right)\right]+\right.$$
$$i\left(\text{Log}\left[e^{-2\,i\,\text{ArcTan}[a+b\,x]}\left((-1)^{3/4}-e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}\right)\right]+\right.$$
$$i\,\text{Log}\left[e^{-2\,i\,\text{ArcTan}[a+b\,x]}\left((-1)^{1/4}+e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}\right)\right]-$$
$$\left.\left.\text{Log}\left[e^{-2\,i\,\text{ArcTan}[a+b\,x]}\left((-1)^{3/4}+e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}\right)\right]\right)\right)+\frac{1}{2\,(-i+a)}$$
$$(1-i\,a)\,\text{RootSum}\left[i+a-i\,\#1^4+a\,\#1^4\,\&,\ \frac{\text{ArcTan}[a+b\,x]-i\,\text{Log}\left[\left(e^{-\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}-\#1\right)^2\right]}{\#1}\,\&\right]$$

Problem 235: Result is not expressed in closed-form.

$$\int \frac{e^{-\frac{3}{2}\,i\,\text{ArcTan}[a+b\,x]}}{x^2}\,dx$$

Optimal (type 3, 211 leaves, 6 steps):

$$-\frac{(1-i\,a-i\,b\,x)^{3/4}\,(1+i\,a+i\,b\,x)^{1/4}}{(1+i\,a)\,x}-$$
$$\frac{3\,i\,b\,\text{ArcTan}\left[\frac{(i+a)^{1/4}\,(1+i\,a+i\,b\,x)^{1/4}}{(i-a)^{1/4}\,(1-i\,a-i\,b\,x)^{1/4}}\right]}{(i-a)^{7/4}\,(i+a)^{1/4}}-\frac{3\,i\,b\,\text{ArcTanh}\left[\frac{(i+a)^{1/4}\,(1+i\,a+i\,b\,x)^{1/4}}{(i-a)^{1/4}\,(1-i\,a-i\,b\,x)^{1/4}}\right]}{(i-a)^{7/4}\,(i+a)^{1/4}}$$

Result (type 7, 133 leaves):

$$\frac{1}{4\,(-i+a)^2}b\left(\frac{8\,(-i+a)\,e^{\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}}{1-e^{2\,i\,\text{ArcTan}[a+b\,x]}+i\,a\,\left(1+e^{2\,i\,\text{ArcTan}[a+b\,x]}\right)}-\right.$$
$$\left.3\,\text{RootSum}\left[i+a-i\,\#1^4+a\,\#1^4\,\&,\ \frac{\text{ArcTan}[a+b\,x]-i\,\text{Log}\left[\left(e^{-\frac{1}{2}\,i\,\text{ArcTan}[a+b\,x]}-\#1\right)^2\right]}{\#1}\,\&\right]\right)$$

Problem 236: Unable to integrate problem.

$$\int e^{n\,\text{ArcTan}[a+b\,x]}\,x^m\,dx$$

Optimal (type 6, 140 leaves, 4 steps):

$$\frac{1}{1+m}x^{1+m}\,(1-i\,a-i\,b\,x)^{\frac{i\,n}{2}}\,(1+i\,a+i\,b\,x)^{-\frac{i\,n}{2}}\left(1-\frac{b\,x}{i-a}\right)^{\frac{i\,n}{2}}$$
$$\left(1+\frac{b\,x}{i+a}\right)^{-\frac{i\,n}{2}}\text{AppellF1}\left[1+m,-\frac{i\,n}{2},\frac{i\,n}{2},2+m,-\frac{b\,x}{i+a},\frac{b\,x}{i-a}\right]$$

Result (type 8, 16 leaves):

$$\int e^{n \,\text{ArcTan}[a+b\,x]}\, x^m \, dx$$

Problem 241: Unable to integrate problem.

$$\int \frac{e^{n \,\text{ArcTan}[a+b\,x]}}{x} \, dx$$

Optimal (type 5, 191 leaves, 5 steps):

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

Result (type 8, 16 leaves):

$$\int \frac{e^{n \,\text{ArcTan}[a+b\,x]}}{x} \, dx$$

Problem 242: Unable to integrate problem.

$$\int \frac{e^{n \,\text{ArcTan}[a+b\,x]}}{x^2} \, dx$$

Optimal (type 5, 128 leaves, 2 steps):

$$-\left(\left(4\, b \left(1 - i\, a - i\, b\, x\right)^{1+\frac{i\,n}{2}} \left(1 + i\, a + i\, b\, x\right)^{-1-\frac{i\,n}{2}} \text{Hypergeometric2F1}\left[2, 1 + \frac{i\,n}{2}, 2 + \frac{i\,n}{2}, \frac{\left(i - a\right) \left(1 - i\, a - i\, b\, x\right)}{\left(i + a\right) \left(1 + i\, a + i\, b\, x\right)}\right]\right) \Big/ \left(\left(i + a\right)^2 \left(2\, i - n\right)\right)\right)$$

Result (type 8, 16 leaves):

$$\int \frac{e^{n \,\text{ArcTan}[a+b\,x]}}{x^2} \, dx$$

Problem 243: Unable to integrate problem.

$$\int \frac{e^{n \,\text{ArcTan}[a+b\,x]}}{x^3} \, dx$$

Optimal (type 5, 207 leaves, 3 steps):

$$-\frac{\left(1 - i\, a - i\, b\, x\right)^{1+\frac{i\,n}{2}} \left(1 + i\, a + i\, b\, x\right)^{1-\frac{i\,n}{2}}}{2 \left(1 + a^2\right) x^2} - \left(2\, b^2 \left(2\, a - n\right) \left(1 - i\, a - i\, b\, x\right)^{1+\frac{i\,n}{2}} \left(1 + i\, a + i\, b\, x\right)^{-1-\frac{i\,n}{2}} \text{Hypergeometric2F1}\left[2, 1 + \frac{i\,n}{2}, 2 + \frac{i\,n}{2}, \frac{\left(i - a\right) \left(1 - i\, a - i\, b\, x\right)}{\left(i + a\right) \left(1 + i\, a + i\, b\, x\right)}\right]\right) \Big/ \left(\left(i - a\right) \left(i + a\right)^3 \left(2\, i - n\right)\right)$$

Result (type 8, 16 leaves):

$$\int \frac{e^{n\,\text{ArcTan}[a+b\,x]}}{x^3}\,dx$$

Problem 244: Unable to integrate problem.

$$\int e^{\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^p\,dx$$

Optimal (type 5, 102 leaves, 3 steps):

$$\frac{1}{a\,\left(\left(2+i\right)+2\,p\right)}\,i\,2^{\left(1-\frac{i}{2}\right)+p}\,\left(1-i\,a\,x\right)^{\left(1+\frac{i}{2}\right)+p}\,\left(1+a^2\,x^2\right)^{-p}\,\left(c+a^2\,c\,x^2\right)^p\,\text{Hypergeometric2F1}\left[\frac{i}{2}-p,\,\left(1+\frac{i}{2}\right)+p,\,\left(2+\frac{i}{2}\right)+p,\,\frac{1}{2}\,\left(1-i\,a\,x\right)\right]$$

Result (type 8, 21 leaves):

$$\int e^{\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^p\,dx$$

Problem 259: Unable to integrate problem.

$$\int e^{2\,\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^p\,dx$$

Optimal (type 5, 90 leaves, 3 steps):

$$\frac{1}{a\,\left(\left(1+i\right)+p\right)}\,i\,2^{-i+p}\,\left(1-i\,a\,x\right)^{\left(1+i\right)+p}\,\left(1+a^2\,x^2\right)^{-p}\,\left(c+a^2\,c\,x^2\right)^p\,\text{Hypergeometric2F1}\left[i-p,\,\left(1+i\right)+p,\,\left(2+i\right)+p,\,\frac{1}{2}\,\left(1-i\,a\,x\right)\right]$$

Result (type 8, 23 leaves):

$$\int e^{2\,\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^p\,dx$$

Problem 260: Result more than twice size of optimal antiderivative.

$$\int e^{2\,\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^2\,dx$$

Optimal (type 5, 53 leaves, 2 steps):

$$\frac{1}{a}\left(\frac{1}{5}+\frac{3\,i}{5}\right)\,2^{1-i}\,c^2\,\left(1-i\,a\,x\right)^{3+i}\,\text{Hypergeometric2F1}\left[-2+i,\,3+i,\,4+i,\,\frac{1}{2}\,\left(1-i\,a\,x\right)\right]$$

Result (type 5, 114 leaves):

$$\frac{1}{30\,a} c^2 e^{2\,\text{ArcTan}[a\,x]} \left(-13+56\,a\,x-16\,a^2\,x^2+22\,a^3\,x^3-3\,a^4\,x^4+6\,a^5\,x^5-40\,i\,\text{Hypergeometric2F1}\left[-i,1,1-i,-e^{2\,i\,\text{ArcTan}[a\,x]}\right]+(20+20\,i)\,e^{2\,i\,\text{ArcTan}[a\,x]}\,\text{Hypergeometric2F1}\left[1,1-i,2-i,-e^{2\,i\,\text{ArcTan}[a\,x]}\right]\right)$$

Problem 273: Unable to integrate problem.

$$\int e^{-\text{ArcTan}[a\,x]} \left(c+a^2\,c\,x^2\right)^p\,dx$$

Optimal (type 5, 101 leaves, 3 steps):

$$\left(2^{\left(1+\frac{i}{2}\right)+p}\,(1-i\,a\,x)^{\left(1-\frac{i}{2}\right)+p}\,\left(1+a^2\,x^2\right)^{-p}\,\left(c+a^2\,c\,x^2\right)^p\,\text{Hypergeometric2F1}\left[-\frac{i}{2}-p,\left(1-\frac{i}{2}\right)+p,\left(2-\frac{i}{2}\right)+p,\frac{1}{2}\,(1-i\,a\,x)\right]\right)\Big/\left(a\,\left((-1-2\,i)-2\,i\,p\right)\right)$$

Result (type 8, 23 leaves):

$$\int e^{-\text{ArcTan}[a\,x]} \left(c+a^2\,c\,x^2\right)^p\,dx$$

Problem 283: Unable to integrate problem.

$$\int \frac{e^{-\text{ArcTan}[a\,x]}}{\sqrt{c+a^2\,c\,x^2}}\,dx$$

Optimal (type 5, 93 leaves, 3 steps):

$$-\frac{1}{a\,\sqrt{c+a^2\,c\,x^2}} (1-i)\,2^{-\frac{1}{2}+\frac{i}{2}}\,(1-i\,a\,x)^{\frac{1}{2}-\frac{i}{2}}\,\sqrt{1+a^2\,x^2}\,\text{Hypergeometric2F1}\left[\frac{1}{2}-\frac{i}{2},\frac{1}{2}-\frac{i}{2},\frac{3}{2}-\frac{i}{2},\frac{1}{2}\,(1-i\,a\,x)\right]$$

Result (type 8, 25 leaves):

$$\int \frac{e^{-\text{ArcTan}[a\,x]}}{\sqrt{c+a^2\,c\,x^2}}\,dx$$

Problem 284: Unable to integrate problem.

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

Optimal (type 3, 38 leaves, 1 step):

$$-\frac{e^{-\text{ArcTan}[a\,x]}\,(1-a\,x)}{2\,a\,c\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 8, 25 leaves):

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

Problem 285: Unable to integrate problem.

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

Optimal (type 3, 77 leaves, 2 steps):

$$-\frac{e^{-\text{ArcTan}[a\,x]}\,\left(1-3\,a\,x\right)}{10\,a\,c\,\left(c+a^2\,c\,x^2\right)^{3/2}}-\frac{3\,e^{-\text{ArcTan}[a\,x]}\,\left(1-a\,x\right)}{10\,a\,c^2\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 8, 25 leaves):

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

Problem 286: Unable to integrate problem.

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

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

$$-\frac{e^{-\text{ArcTan}[a\,x]}\,\left(1-5\,a\,x\right)}{26\,a\,c\,\left(c+a^2\,c\,x^2\right)^{5/2}}-\frac{e^{-\text{ArcTan}[a\,x]}\,\left(1-3\,a\,x\right)}{13\,a\,c^2\,\left(c+a^2\,c\,x^2\right)^{3/2}}-\frac{3\,e^{-\text{ArcTan}[a\,x]}\,\left(1-a\,x\right)}{13\,a\,c^3\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 8, 25 leaves):

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

Problem 287: Unable to integrate problem.

$$\int e^{-2\,\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^p\,dx$$

Optimal (type 5, 90 leaves, 3 steps):

$$\frac{1}{a\,\left(\left(1-i\right)+p\right)}\,i\,2^{i+p}\,\left(1-i\,a\,x\right)^{(1-i)+p}\,\left(1+a^2\,x^2\right)^{-p}\,\left(c+a^2\,c\,x^2\right)^p$$
$$\text{Hypergeometric2F1}\left[-i-p,\,\left(1-i\right)+p,\,\left(2-i\right)+p,\,\frac{1}{2}\,\left(1-i\,a\,x\right)\right]$$

Result (type 8, 23 leaves):

$$\int e^{-2\,\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^p\,dx$$

Problem 288: Result more than twice size of optimal antiderivative.

$$\int e^{-2\,\text{ArcTan}[a\,x]}\left(c+a^2\,c\,x^2\right)^2\,dx$$

Optimal (type 5, 53 leaves, 2 steps):

$$-\frac{1}{a}\left(\frac{1}{5}-\frac{3\,i}{5}\right)2^{1+i}\,c^2\,\left(1-i\,a\,x\right)^{3-i}\,\text{Hypergeometric2F1}\left[-2-i,\,3-i,\,4-i,\,\frac{1}{2}\,\left(1-i\,a\,x\right)\right]$$

Result (type 5, 114 leaves):

$$\frac{1}{30\,a}c^2\,e^{-2\,\text{ArcTan}[a\,x]}\,\left(13+56\,a\,x+16\,a^2\,x^2+22\,a^3\,x^3+3\,a^4\,x^4+6\,a^5\,x^5-40\,i\,\text{Hypergeometric2F1}\left[i,\,1,\,1+i,\,-e^{2\,i\,\text{ArcTan}[a\,x]}\right]-\left(20-20\,i\right)\,e^{2\,i\,\text{ArcTan}[a\,x]}\,\text{Hypergeometric2F1}\left[1,\,1+i,\,2+i,\,-e^{2\,i\,\text{ArcTan}[a\,x]}\right]\right)$$

Problem 297: Unable to integrate problem.

$$\int \frac{e^{-2\,\text{ArcTan}[a\,x]}}{\sqrt{c+a^2\,c\,x^2}}\,dx$$

Optimal (type 5, 87 leaves, 3 steps):

$$-\frac{1}{a\,\sqrt{c+a^2\,c\,x^2}}\left(\frac{2}{5}-\frac{i}{5}\right)2^{\frac{1}{2}+i}\,\left(1-i\,a\,x\right)^{\frac{1}{2}-i}\,\sqrt{1+a^2\,x^2}\,\text{Hypergeometric2F1}\left[\frac{1}{2}-i,\,\frac{1}{2}-i,\,\frac{3}{2}-i,\,\frac{1}{2}\,\left(1-i\,a\,x\right)\right]$$

Result (type 8, 25 leaves):

$$\int \frac{e^{-2\,\text{ArcTan}[a\,x]}}{\sqrt{c+a^2\,c\,x^2}}\,dx$$

Problem 298: Unable to integrate problem.

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

Optimal (type 3, 38 leaves, 1 step):

$$-\frac{e^{-2\,\text{ArcTan}[a\,x]}\,\left(2-a\,x\right)}{5\,a\,c\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 8, 25 leaves):

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

Problem 299: Unable to integrate problem.

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

Optimal (type 3, 77 leaves, 2 steps):

$$-\frac{e^{-2\,\text{ArcTan}[a\,x]}\,(2-3\,a\,x)}{13\,a\,c\,\left(c+a^2\,c\,x^2\right)^{3/2}}-\frac{6\,e^{-2\,\text{ArcTan}[a\,x]}\,(2-a\,x)}{65\,a\,c^2\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 8, 25 leaves):

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

Problem 300: Unable to integrate problem.

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

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

$$-\frac{e^{-2\,\text{ArcTan}[a\,x]}\,(2-5\,a\,x)}{29\,a\,c\,\left(c+a^2\,c\,x^2\right)^{5/2}}-\frac{20\,e^{-2\,\text{ArcTan}[a\,x]}\,(2-3\,a\,x)}{377\,a\,c^2\,\left(c+a^2\,c\,x^2\right)^{3/2}}-\frac{24\,e^{-2\,\text{ArcTan}[a\,x]}\,(2-a\,x)}{377\,a\,c^3\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 8, 25 leaves):

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

Problem 314: Result unnecessarily involves higher level functions.

$$\int \frac{e^{i\,\text{ArcTan}[a\,x]}}{\sqrt{c+a^2\,c\,x^2}}\,dx$$

Optimal (type 3, 42 leaves, 3 steps):

$$\frac{i\,\sqrt{1+a^2\,x^2}\,\text{Log}[i+a\,x]}{a\,\sqrt{c+a^2\,c\,x^2}}$$

Result (type 4, 81 leaves):

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

Problem 315: Result unnecessarily involves higher level functions.

$$\int \frac{e^{-i \,\text{ArcTan}[a\,x]}}{\sqrt{c + a^2 c\, x^2}}\, dx$$

Optimal (type 3, 43 leaves, 3 steps):

$$-\frac{i \sqrt{1 + a^2 x^2}\; \text{Log}[i - a\,x]}{a \sqrt{c + a^2 c\, x^2}}$$

Result (type 4, 81 leaves):

$$-\left(\left(i \sqrt{1 + a^2 x^2}\, \left(2\, a\, \text{EllipticF}\left[i\, \text{ArcSinh}\left[\sqrt{a^2}\; x\right],\, 1\right] + \sqrt{a^2}\; \text{Log}\left[1 + a^2 x^2\right]\right)\right) \Big/ \left(2\, a \sqrt{a^2}\; \sqrt{c + a^2 c\, x^2}\right)\right)$$

Problem 337: Result more than twice size of optimal antiderivative.

$$\int e^{n\,\text{ArcTan}[a\,x]}\, \left(c + a^2 c\, x^2\right)^2 dx$$

Optimal (type 5, 86 leaves, 2 steps):

$$-\frac{1}{a\,(6\,i - n)} 2^{3-\frac{i\,n}{2}}\, c^2\, (1 - i\,a\,x)^{3+\frac{i\,n}{2}}\, \text{Hypergeometric2F1}\left[-2 + \frac{i\,n}{2},\, 3 + \frac{i\,n}{2},\, 4 + \frac{i\,n}{2},\, \frac{1}{2}\,(1 - i\,a\,x)\right]$$

Result (type 5, 207 leaves):

$$\frac{1}{120\,a} c^2\, e^{n\,\text{ArcTan}[a\,x]} \Big(-22\,n - n^3 + 120\,a\,x + 22\,a\,n^2\,x + a\,n^4\,x - 28\,a^2\,n\,x^2 - a^2\,n^3\,x^2 + 80\,a^3\,x^3 + 2\,a^3\,n^2\,x^3 - 6\,a^4\,n\,x^4 + 24\,a^5\,x^5 +$$
$$e^{2\,i\,\text{ArcTan}[a\,x]}\, n\, \left(32 + 16\,i\,n + 2\,n^2 + i\,n^3\right)\, \text{Hypergeometric2F1}\left[1,\, 1 - \frac{i\,n}{2},\, 2 - \frac{i\,n}{2},\, -e^{2\,i\,\text{ArcTan}[a\,x]}\right] -$$
$$i\, \left(64 + 20\,n^2 + n^4\right)\, \text{Hypergeometric2F1}\left[1,\, -\frac{i\,n}{2},\, 1 - \frac{i\,n}{2},\, -e^{2\,i\,\text{ArcTan}[a\,x]}\right]\Big)$$

Problem 348: Result more than twice size of optimal antiderivative.

$$\int e^{n\,\text{ArcTan}[a\,x]}\, \left(c + a^2 c\, x^2\right)^{3/2} dx$$

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

$$-\left(\left(2^{\frac{5}{2}-\frac{i\,n}{2}}\, c\, (1 - i\,a\,x)^{\frac{1}{2}(5+i\,n)}\, \sqrt{c + a^2 c\, x^2}\; \text{Hypergeometric2F1}\left[\right.\right.\right.$$
$$\left.\left.\left.\frac{1}{2}\,(-3 + i\,n),\, \frac{1}{2}\,(5 + i\,n),\, \frac{1}{2}\,(7 + i\,n),\, \frac{1}{2}\,(1 - i\,a\,x)\right]\right) \Big/ \left(a\,(5\,i - n)\, \sqrt{1 + a^2 x^2}\right)\right)$$

Result (type 5, 267 leaves):

$$\frac{1}{96\, a \sqrt{c+a^2 c x^2}} c^2 \Big(e^{n \text{ArcTan}[a x]} \left(1+a^2 x^2\right)^2 \Big(n-3 n^3+18 a x+2 a n^2 x+2 a \left(-3+n^2\right) x \,\text{Cos}[2 \text{ArcTan}[a x]]- n \left(-3+n^2\right) \sqrt{1+a^2 x^2}\, \text{Cos}[3 \text{ArcTan}[a x]]\Big)+8 e^{(i+n) \text{ArcTan}[a x]} \left(3 i-3 n-i n^2+n^3\right) \sqrt{1+a^2 x^2}\, \text{Hypergeometric2F1}\left[1,\frac{1}{2}-\frac{i n}{2},\frac{3}{2}-\frac{i n}{2},-e^{2 i \text{ArcTan}[a x]}\right]+ 48 e^{n \text{ArcTan}[a x]} \left(1+a^2 x^2\right) \left(-n+a x+\left(1+e^{2 i \text{ArcTan}[a x]}\right) (-i+n)\, \text{Hypergeometric2F1}\left[1,\frac{1}{2}-\frac{i n}{2},\frac{3}{2}-\frac{i n}{2},-e^{2 i \text{ArcTan}[a x]}\right]\right)\Big)$$

Problem 351: Result more than twice size of optimal antiderivative.

$$\int e^{n \text{ArcTan}[a x]} x^2 \left(c+a^2 c x^2\right)^{3/2} dx$$

Optimal (type 5, 283 leaves, 5 steps):

$$-\frac{c n (1-i a x)^{\frac{1}{2}(5+i n)} (1+i a x)^{\frac{1}{2}(5-i n)} \sqrt{c+a^2 c x^2}}{30 a^3 \sqrt{1+a^2 x^2}}+\frac{c x (1-i a x)^{\frac{1}{2}(5+i n)} (1+i a x)^{\frac{1}{2}(5-i n)} \sqrt{c+a^2 c x^2}}{6 a^2 \sqrt{1+a^2 x^2}}+\left(2^{\frac{3}{2}-\frac{i n}{2}} c \left(5-n^2\right) (1-i a x)^{\frac{1}{2}(5+i n)} \sqrt{c+a^2 c x^2}\, \text{Hypergeometric2F1}\left[\frac{1}{2}(-3+i n),\frac{1}{2}(5+i n),\frac{1}{2}(7+i n),\frac{1}{2}(1-i a x)\right]\right)\Big/\left(15 a^3 (5 i-n) \sqrt{1+a^2 x^2}\right)$$

Result (type 5, 1283 leaves):

$$\Big(c^2 \sqrt{1+a^2 x^2} \Big(-\frac{1}{2} e^{n \text{ArcTan}[a x]} \left(1+a^2 x^2\right)^2 \Big(\frac{n \left(-1+3 n^2\right)}{\sqrt{1+a^2 x^2}}-\frac{2 a x \left(9+n^2+\left(-3+n^2\right) \text{Cos}[2 \text{ArcTan}[a x]]\right)}{\sqrt{1+a^2 x^2}}+ n \left(-3+n^2\right) \text{Cos}[3 \text{ArcTan}[a x]]\Big)+4 e^{(i+n) \text{ArcTan}[a x]} \left(3 i-3 n-i n^2+n^3\right) \text{Hypergeometric2F1}\left[1,\frac{1}{2}-\frac{i n}{2},\frac{3}{2}-\frac{i n}{2},-e^{2 i \text{ArcTan}[a x]}\right]\Big)\Big)\Big/ \left(48 a^3 \sqrt{c \left(1+a^2 x^2\right)}\right)+\frac{1}{a^3} c^2 \Big(-\frac{e^{n \text{ArcTan}[a x]} \left(19 n-25 n^3+n^5\right) \sqrt{1+a^2 x^2}}{720 \sqrt{c \left(1+a^2 x^2\right)}}+ \Big(e^{(i+n) \text{ArcTan}[a x]} \left(e^{2 i \text{ArcTan}[a x]}\right)^{\frac{1}{2}-\frac{i n}{2}+\frac{1}{2} i (i+n)} \left(1+n^2\right) \left(45-26 n^2+n^4\right) \sqrt{1+a^2 x^2}\, \text{Hypergeometric2F1}\left[1,-\frac{1}{2} i (i+n),1-\frac{1}{2} i (i+n),-e^{2 i \text{ArcTan}[a x]}\right]\Big)\Big/\Big(360 (i+n)$$

$$\left.\sqrt{c\,\left(1+a^2\,x^2\right)}\,\right)+\frac{e^{n\,\text{ArcTan}[a\,x]}\,\sqrt{1+a^2\,x^2}}{48\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^6}+$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,\left(-30-2\,n+n^2\right)\,\sqrt{1+a^2\,x^2}}{480\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^4}+$$

$$\left(e^{n\,\text{ArcTan}[a\,x]}\,\left(45+26\,n-26\,n^2-n^3+n^4\right)\,\sqrt{1+a^2\,x^2}\right)\Big/$$

$$\left(1440\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^2\right)-$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,n\,\sqrt{1+a^2\,x^2}\,\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]}{120\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^5}-$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,n\,\left(-26+n^2\right)\,\sqrt{1+a^2\,x^2}\,\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]}{720\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^3}-$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,n\,\left(19-25\,n^2+n^4\right)\,\sqrt{1+a^2\,x^2}\,\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]}{720\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]-\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)}-$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,\sqrt{1+a^2\,x^2}}{48\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^6}+$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,n\,\sqrt{1+a^2\,x^2}\,\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]}{120\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^5}-$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,\left(-30+2\,n+n^2\right)\,\sqrt{1+a^2\,x^2}}{480\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^4}+$$

$$\frac{e^{n\,\text{ArcTan}[a\,x]}\,n\,\left(-26+n^2\right)\,\sqrt{1+a^2\,x^2}\,\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]}{720\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^3}-$$

$$\left(e^{n\,\text{ArcTan}[a\,x]}\,\left(45-26\,n-26\,n^2+n^3+n^4\right)\,\sqrt{1+a^2\,x^2}\right)\Big/$$

$$\left(1440\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)^2\right)+$$

$$\left.\frac{e^{n\,\text{ArcTan}[a\,x]}\,n\,\left(19-25\,n^2+n^4\right)\,\sqrt{1+a^2\,x^2}\,\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]}{720\,\sqrt{c\,\left(1+a^2\,x^2\right)}\,\left(\text{Cos}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]+\text{Sin}\left[\frac{1}{2}\,\text{ArcTan}[a\,x]\right]\right)}\right)$$

Problem 360: Unable to integrate problem.

$$\int e^{n\,\text{ArcTan}[a\,x]}\,\left(c+a^2\,c\,x^2\right)^{1/3}\,dx$$

Optimal (type 5, 120 leaves, 3 steps):

$$-\left(\left(3\times 2^{\frac{4}{3}-\frac{i n}{2}}\left(1-i a x\right)^{\frac{1}{6}(8+3 i n)}\left(c+a^2 c x^2\right)^{1/3}\text{Hypergeometric2F1}\left[\frac{1}{6}(-2+3 i n),\frac{1}{6}(8+3 i n),\frac{1}{6}(14+3 i n),\frac{1}{2}(1-i a x)\right]\right)\Big/\left(a\,(8 i-3 n)\left(1+a^2 x^2\right)^{1/3}\right)\right)$$

Result (type 8, 25 leaves):

$$\int e^{n\,\text{ArcTan}[a x]}\left(c+a^2 c x^2\right)^{1/3}dx$$

Problem 361: Unable to integrate problem.

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

Optimal (type 5, 120 leaves, 3 steps):

$$-\left(\left(3\times 2^{\frac{2}{3}-\frac{i n}{2}}\left(1-i a x\right)^{\frac{1}{6}(4+3 i n)}\left(1+a^2 x^2\right)^{1/3}\text{Hypergeometric2F1}\left[\frac{1}{6}(2+3 i n),\frac{1}{6}(4+3 i n),\frac{1}{6}(10+3 i n),\frac{1}{2}(1-i a x)\right]\right)\Big/\left(a\,(4 i-3 n)\left(c+a^2 c x^2\right)^{1/3}\right)\right)$$

Result (type 8, 25 leaves):

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

Problem 362: Unable to integrate problem.

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

Optimal (type 5, 120 leaves, 3 steps):

$$-\left(\left(3\times 2^{\frac{1}{3}-\frac{i n}{2}}\left(1-i a x\right)^{\frac{1}{6}(2+3 i n)}\left(1+a^2 x^2\right)^{2/3}\text{Hypergeometric2F1}\left[\frac{1}{6}(2+3 i n),\frac{1}{6}(4+3 i n),\frac{1}{6}(8+3 i n),\frac{1}{2}(1-i a x)\right]\right)\Big/\left(a\,(2 i-3 n)\left(c+a^2 c x^2\right)^{2/3}\right)\right)$$

Result (type 8, 25 leaves):

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

Problem 363: Unable to integrate problem.

$$\int \frac{e^{n\,\text{ArcTan}[a x]}}{\left(c+a^2 c x^2\right)^{4/3}}dx$$

Optimal (type 5, 123 leaves, 3 steps):

$$\left(3\times 2^{-\frac{1}{3}-\frac{i n}{2}} (1-i a x)^{\frac{1}{6}(-2+3 i n)} \left(1+a^2 x^2\right)^{1/3} \text{Hypergeometric2F1}\left[\frac{1}{6}(-2+3 i n), \frac{1}{6}(8+3 i n), \frac{1}{6}(4+3 i n), \frac{1}{2}(1-i a x)\right]\right) \Big/ \left(a c (2 i+3 n) \left(c+a^2 c x^2\right)^{1/3}\right)$$

Result (type 8, 25 leaves):

$$\int \frac{e^{n \text{ArcTan}[a x]}}{\left(c+a^2 c x^2\right)^{4/3}} \, dx$$

Problem 364: Unable to integrate problem.

$$\int e^{n \text{ArcTan}[a x]} x^m \left(c+a^2 c x^2\right) dx$$

Optimal (type 6, 49 leaves, 2 steps):

$$\frac{c x^{1+m} \text{AppellF1}\left[1+m, -1-\frac{i n}{2}, -1+\frac{i n}{2}, 2+m, i a x, -i a x\right]}{1+m}$$

Result (type 8, 24 leaves):

$$\int e^{n \text{ArcTan}[a x]} x^m \left(c+a^2 c x^2\right) dx$$

Problem 366: Unable to integrate problem.

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^2} \, dx$$

Optimal (type 6, 51 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, 2-\frac{i n}{2}, 2+\frac{i n}{2}, 2+m, i a x, -i a x\right]}{c^2 (1+m)}$$

Result (type 8, 26 leaves):

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^2} \, dx$$

Problem 367: Unable to integrate problem.

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^3} \, dx$$

Optimal (type 6, 51 leaves, 2 steps):

$$\frac{x^{1+m} \text{AppellF1}\left[1+m, 3-\frac{i n}{2}, 3+\frac{i n}{2}, 2+m, i a x, -i a x\right]}{c^3 (1+m)}$$

Result (type 8, 26 leaves):

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^3} \, dx$$

Problem 368: Unable to integrate problem.

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\sqrt{c+a^2 c x^2}} \, dx$$

Optimal (type 6, 79 leaves, 3 steps):

$$\left(x^{1+m} \sqrt{1+a^2 x^2} \text{AppellF1}\left[1+m, \frac{1}{2} (1-i n), \frac{1}{2} (1+i n), 2+m, i a x, -i a x\right]\right) \Big/ \left((1+m) \sqrt{c+a^2 c x^2}\right)$$

Result (type 8, 28 leaves):

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\sqrt{c+a^2 c x^2}} \, dx$$

Problem 369: Unable to integrate problem.

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^{3/2}} \, dx$$

Optimal (type 6, 82 leaves, 3 steps):

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

Result (type 8, 28 leaves):

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^{3/2}} \, dx$$

Problem 370: Unable to integrate problem.

$$\int \frac{e^{n \text{ArcTan}[a x]} x^m}{\left(c+a^2 c x^2\right)^{5/2}} \, dx$$

Optimal (type 6, 82 leaves, 3 steps):

$$\left(x^{1+m} \sqrt{1+a^2 x^2} \text{AppellF1}\left[1+m, \frac{1}{2} (5-i n), \frac{1}{2} (5+i n), 2+m, i a x, -i a x\right]\right) \Big/ \left(c^2 (1+m) \sqrt{c+a^2 c x^2}\right)$$

Result (type 8, 28 leaves):

$$\int \frac{e^{n \, \text{ArcTan}[a\, x]}\, x^m}{\left(c + a^2\, c\, x^2\right)^{5/2}}\, dx$$

Problem 371: Unable to integrate problem.

$$\int e^{n \, \text{ArcTan}[a\, x]} \left(c + a^2\, c\, x^2\right)^p dx$$

Optimal (type 5, 115 leaves, 3 steps):

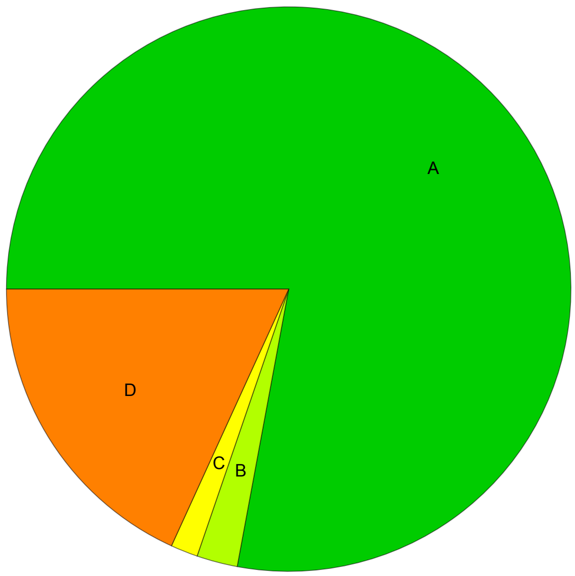
$$\left(2^{1-\frac{i\, n}{2}+p} \left(1 - i\, a\, x\right)^{1+\frac{i\, n}{2}+p} \left(1 + a^2\, x^2\right)^{-p} \left(c + a^2\, c\, x^2\right)^p \text{Hypergeometric2F1}\left[\frac{i\, n}{2} - p,\, 1 + \frac{i\, n}{2} + p,\, 2 + \frac{i\, n}{2} + p,\, \frac{1}{2} \left(1 - i\, a\, x\right)\right]\right) \Big/ \left(a \left(n - 2\, i \left(1 + p\right)\right)\right)$$

Result (type 8, 23 leaves):

$$\int e^{n \, \text{ArcTan}[a\, x]} \left(c + a^2\, c\, x^2\right)^p dx$$

Summary of Integration Test Results

385 integration problems



A - 300 optimal antiderivatives

B - 9 more than twice size of optimal antiderivatives

C - 6 unnecessarily complex antiderivatives

D - 70 unable to integrate problems

E - 0 integration timeouts