Mathematica 11.3 Integration Test Results

Test results for the 284 problems in "Hearn Problems.m"

Problem 20: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{1+x^2+x^4}\,dx$$

Optimal (type 3, 67 leaves, 9 steps):

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

Result (type 3, 73 leaves):

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

Problem 44: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{2+x^2+x^4}\,dx$$

Optimal (type 3, 196 leaves, 9 steps):

$$-\frac{1}{2}\sqrt{\frac{1}{14}\left(-1+2\sqrt{2}\right)}\,\text{ArcTan}\left[\frac{\sqrt{-1+2\sqrt{2}}-2x}{\sqrt{1+2\sqrt{2}}}\right]+$$
$$\frac{1}{2}\sqrt{\frac{1}{14}\left(-1+2\sqrt{2}\right)}\,\text{ArcTan}\left[\frac{\sqrt{-1+2\sqrt{2}}+2x}{\sqrt{1+2\sqrt{2}}}\right]-\frac{\text{Log}\left[\sqrt{2}-\sqrt{-1+2\sqrt{2}}\,x+x^2\right]}{4\sqrt{2\left(-1+2\sqrt{2}\right)}}+\frac{\text{Log}\left[\sqrt{2}+\sqrt{-1+2\sqrt{2}}\,x+x^2\right]}{4\sqrt{2\left(-1+2\sqrt{2}\right)}}$$

Result (type 3, 91 leaves):

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

Problem 45: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{2-x^2+x^4}\,dx$$

Optimal (type 3, 196 leaves, 9 steps):

$$-\frac{1}{2}\sqrt{\frac{1}{14}\left(1+2\sqrt{2}\right)}\,\text{ArcTan}\left[\frac{\sqrt{1+2\sqrt{2}}-2x}{\sqrt{-1+2\sqrt{2}}}\right]+\frac{1}{2}\sqrt{\frac{1}{14}\left(1+2\sqrt{2}\right)}\,\text{ArcTan}\left[\frac{\sqrt{1+2\sqrt{2}}+2x}{\sqrt{-1+2\sqrt{2}}}\right]-\frac{\text{Log}\left[\sqrt{2}-\sqrt{1+2\sqrt{2}}\,x+x^2\right]}{4\sqrt{2\left(1+2\sqrt{2}\right)}}+\frac{\text{Log}\left[\sqrt{2}+\sqrt{1+2\sqrt{2}}\,x+x^2\right]}{4\sqrt{2\left(1+2\sqrt{2}\right)}}$$

Result (type 3, 91 leaves):

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

Problem 51: Result is not expressed in closed-form.

$$\int \frac{1}{1-x^4+x^8}\,dx$$

Optimal (type 3, 275 leaves, 19 steps):

$$-\frac{\text{ArcTan}\left[\frac{\sqrt{2-\sqrt{3}}-2x}{\sqrt{2+\sqrt{3}}}\right]}{2\sqrt{6}}-\frac{\text{ArcTan}\left[\frac{\sqrt{2+\sqrt{3}}-2x}{\sqrt{2-\sqrt{3}}}\right]}{2\sqrt{6}}+\frac{\text{ArcTan}\left[\frac{\sqrt{2-\sqrt{3}}+2x}{\sqrt{2+\sqrt{3}}}\right]}{2\sqrt{6}}+\frac{\text{ArcTan}\left[\frac{\sqrt{2+\sqrt{3}}+2x}{\sqrt{2-\sqrt{3}}}\right]}{2\sqrt{6}}-\frac{\text{Log}\left[1-\sqrt{2-\sqrt{3}}\,x+x^2\right]}{4\sqrt{6}}+\frac{\text{Log}\left[1+\sqrt{2-\sqrt{3}}\,x+x^2\right]}{4\sqrt{6}}-\frac{\text{Log}\left[1-\sqrt{2+\sqrt{3}}\,x+x^2\right]}{4\sqrt{6}}+\frac{\text{Log}\left[1+\sqrt{2+\sqrt{3}}\,x+x^2\right]}{4\sqrt{6}}$$

Result (type 7, 42 leaves):

$$\frac{1}{4}\,\text{RootSum}\left[1-\#1^4+\#1^8\,\&,\ \frac{\text{Log}[x-\#1]}{-\#1^3+2\,\#1^7}\,\&\right]$$

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

$$\int\frac{x^7}{1+x^{12}}\,dx$$

Optimal (type 3, 49 leaves, 7 steps):

$$-\frac{\text{ArcTan}\left[\frac{1-2x^4}{\sqrt{3}}\right]}{4\sqrt{3}}-\frac{1}{12}\,\text{Log}\left[1+x^4\right]+\frac{1}{24}\,\text{Log}\left[1-x^4+x^8\right]$$

Result (type 3, 260 leaves):

$$\frac{1}{24}\left(2\sqrt{3}\,\text{ArcTan}\left[\frac{1+\sqrt{3}-2\sqrt{2}\,x}{1-\sqrt{3}}\right]-2\sqrt{3}\,\text{ArcTan}\left[\frac{1-\sqrt{3}+2\sqrt{2}\,x}{1+\sqrt{3}}\right]+2\sqrt{3}\,\text{ArcTan}\left[\frac{-1+\sqrt{3}+2\sqrt{2}\,x}{1+\sqrt{3}}\right]-2\sqrt{3}\,\text{ArcTan}\left[\frac{1+\sqrt{3}+2\sqrt{2}\,x}{-1+\sqrt{3}}\right]-2\,\text{Log}\left[1-\sqrt{2}\,x+x^2\right]-2\,\text{Log}\left[1+\sqrt{2}\,x+x^2\right]+\text{Log}\left[2+\sqrt{2}\,x-\sqrt{6}\,x+2x^2\right]+\text{Log}\left[2+\sqrt{2}\left(-1+\sqrt{3}\right)x+2x^2\right]+\text{Log}\left[2-\left(\sqrt{2}+\sqrt{6}\right)x+2x^2\right]+\text{Log}\left[2+\left(\sqrt{2}+\sqrt{6}\right)x+2x^2\right]\right)$$

Problem 81: Result more than twice size of optimal antiderivative.

$$\int\text{Sec}[x]\,dx$$

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

$$\text{ArcTanh}[\text{Sin}[x]]$$

Result (type 3, 33 leaves):

$$-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]\right]$$

Problem 82: Result more than twice size of optimal antiderivative.

$$\int\text{Csc}[x]\,dx$$

Optimal (type 3, 5 leaves, 1 step):

$-\text{ArcTanh}[\text{Cos}[x]]$

Result (type 3, 17 leaves):

$-\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]\right]+\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]\right]$

Problem 108: Result more than twice size of optimal antiderivative.

$$\int \text{Cos}[a+b\,x]\,dx$$

Optimal (type 3, 10 leaves, 1 step):

$$\frac{\text{Sin}[a+b\,x]}{b}$$

Result (type 3, 21 leaves):

$$\frac{\text{Cos}[b\,x]\,\text{Sin}[a]}{b}+\frac{\text{Cos}[a]\,\text{Sin}[b\,x]}{b}$$

Problem 111: Result more than twice size of optimal antiderivative.

$$\int \text{Csc}[a+b\,x]\,dx$$

Optimal (type 3, 12 leaves, 1 step):

$$-\frac{\text{ArcTanh}[\text{Cos}[a+b\,x]]}{b}$$

Result (type 3, 38 leaves):

$$-\frac{\text{Log}\left[\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right]}{b}+\frac{\text{Log}\left[\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right]}{b}$$

Problem 112: Result more than twice size of optimal antiderivative.

$$\int \text{Sec}[a+b\,x]\,dx$$

Optimal (type 3, 11 leaves, 1 step):

$$\frac{\text{ArcTanh}[\text{Sin}[a+b\,x]]}{b}$$

Result (type 3, 68 leaves):

$$-\frac{\text{Log}\left[\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]-\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right]}{b}+\frac{\text{Log}\left[\text{Cos}\left[\frac{a}{2}+\frac{b\,x}{2}\right]+\text{Sin}\left[\frac{a}{2}+\frac{b\,x}{2}\right]\right]}{b}$$

Problem 120: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 10 leaves, 1 step):

$$-\frac{\text{Cos}[x]}{1+\text{Sin}[x]}$$

Result (type 3, 23 leaves):

$$\frac{2\,\text{Sin}\left[\frac{x}{2}\right]}{\text{Cos}\left[\frac{x}{2}\right]+\text{Sin}\left[\frac{x}{2}\right]}$$

Problem 121: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{1-\text{Sin}[x]}\,dx$$

Optimal (type 3, 11 leaves, 1 step):

$$\frac{\text{Cos}[x]}{1-\text{Sin}[x]}$$

Result (type 3, 25 leaves):

$$\frac{2\,\text{Sin}\left[\frac{x}{2}\right]}{\text{Cos}\left[\frac{x}{2}\right]-\text{Sin}\left[\frac{x}{2}\right]}$$

Problem 190: Result more than twice size of optimal antiderivative.

$$\int \frac{1}{\sqrt{-1+x^2}}\,dx$$

Optimal (type 3, 12 leaves, 2 steps):

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

Result (type 3, 38 leaves):

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

Problem 197: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{x\,\sqrt{-1+x^2-x^4}}\,dx$$

Optimal (type 3, 30 leaves, 3 steps):

$$-\frac{1}{2}\,\text{ArcTan}\left[\frac{2-x^2}{2\,\sqrt{-1+x^2-x^4}}\right]$$

Result (type 3, 37 leaves):

$$-i\,\text{Log}[x]+\frac{1}{2}\,i\,\text{Log}\left[-2+x^2+2\,i\,\sqrt{-1+x^2-x^4}\right]$$

Problem 202: Result more than twice size of optimal antiderivative.

$$\int \left(\frac{10}{\sqrt{-4+x^2}}+\frac{1}{\sqrt{-1+x^2}}\right) dx$$

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

$$10\,\text{ArcTanh}\left[\frac{x}{\sqrt{-4+x^2}}\right]+\text{ArcTanh}\left[\frac{x}{\sqrt{-1+x^2}}\right]$$

Result (type 3, 71 leaves):

$$-5\,\text{Log}\left[1-\frac{x}{\sqrt{-4+x^2}}\right]+5\,\text{Log}\left[1+\frac{x}{\sqrt{-4+x^2}}\right]-\frac{1}{2}\,\text{Log}\left[1-\frac{x}{\sqrt{-1+x^2}}\right]+\frac{1}{2}\,\text{Log}\left[1+\frac{x}{\sqrt{-1+x^2}}\right]$$

Problem 206: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{r\,\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,h\,r^2}}\,dr$$

Optimal (type 3, 46 leaves, 3 steps):

$$\frac{\text{ArcTan}\left[\frac{\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,h\,r^2}}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}\right]}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}$$

Result (type 3, 58 leaves):

$$-\frac{i\,\text{Log}\left[\frac{2\left(-i\sqrt{\text{alpha}^2+\text{epsilon}^2}+\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,h\,r^2}\right)}{r}\right]}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}$$

Problem 207: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{r\sqrt{-\text{alpha}^2-2\,k\,r+2\,h\,r^2}}\,dr$$

Optimal (type 3, 37 leaves, 2 steps):

$$-\frac{\text{ArcTan}\left[\frac{\text{alpha}^2+k\,r}{\text{alpha}\sqrt{-\text{alpha}^2-2\,k\,r+2\,h\,r^2}}\right]}{\text{alpha}}$$

Result (type 3, 48 leaves):

$$-\frac{i\,\text{Log}\left[\frac{2\left(-\frac{i\,(\text{alpha}^2+k\,r)}{\text{alpha}}+\sqrt{-\text{alpha}^2+2\,r\,(-k+h\,r)}\right)}{r}\right]}{\text{alpha}}$$

Problem 208: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{r\sqrt{-\text{alpha}^2-\text{epsilon}^2-2\,k\,r+2\,h\,r^2}}\,dr$$

Optimal (type 3, 61 leaves, 2 steps):

$$-\frac{\text{ArcTan}\left[\frac{\text{alpha}^2+\text{epsilon}^2+k\,r}{\sqrt{\text{alpha}^2+\text{epsilon}^2}\sqrt{-\text{alpha}^2-\text{epsilon}^2-2\,k\,r+2\,h\,r^2}}\right]}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}$$

Result (type 3, 72 leaves):

$$-\frac{i \operatorname{Log}\left[\frac{2\left(-\frac{i\left(\text{alpha}^2+\text{epsilon}^2+k\,r\right)}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}+\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,r\,(-k+h\,r)}\right)}{r}\right]}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}$$

Problem 211: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{r}{\sqrt{-\text{alpha}^2+2\,e\,r^2-2\,k\,r^4}}\,dr$$

Optimal (type 3, 56 leaves, 3 steps):

$$-\frac{\operatorname{ArcTan}\left[\frac{e-2\,k\,r^2}{\sqrt{2}\,\sqrt{k}\,\sqrt{-\text{alpha}^2+2\,e\,r^2-2\,k\,r^4}}\right]}{2\,\sqrt{2}\,\sqrt{k}}$$

Result (type 3, 66 leaves):

$$\frac{i \operatorname{Log}\left[-\frac{i\,\sqrt{2}\,\left(-e+2\,k\,r^2\right)}{\sqrt{k}}+2\,\sqrt{-\text{alpha}^2+2\,e\,r^2-2\,k\,r^4}\right]}{2\,\sqrt{2}\,\sqrt{k}}$$

Problem 213: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{r\,\sqrt{-\text{alpha}^2+2\,h\,r^2-2\,k\,r^4}}\,dr$$

Optimal (type 3, 44 leaves, 3 steps):

$$-\frac{\operatorname{ArcTan}\left[\frac{\text{alpha}^2-h\,r^2}{\text{alpha}\,\sqrt{-\text{alpha}^2+2\,h\,r^2-2\,k\,r^4}}\right]}{2\,\text{alpha}}$$

Result (type 3, 59 leaves):

$$-\frac{i \operatorname{Log}\left[\frac{-2\,i\,\text{alpha}^2+2\,i\,h\,r^2+2\,\text{alpha}\,\sqrt{-\text{alpha}^2+2\,r^2\,\left(h-k\,r^2\right)}}{\text{alpha}\,r^2}\right]}{2\,\text{alpha}}$$

Problem 214: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{1}{r\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,h\,r^2-2\,k\,r^4}}\,dr$$

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

$$-\frac{\text{ArcTan}\left[\frac{\text{alpha}^2+\text{epsilon}^2-h\,r^2}{\sqrt{\text{alpha}^2+\text{epsilon}^2}\,\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,h\,r^2-2\,k\,r^4}}\right]}{2\sqrt{\text{alpha}^2+\text{epsilon}^2}}$$

Result (type 3, 80 leaves):

$$-\frac{i\,\text{Log}\left[\frac{2\left(-\frac{i\,(\text{alpha}^2+\text{epsilon}^2-h\,r^2)}{\sqrt{\text{alpha}^2+\text{epsilon}^2}}+\sqrt{-\text{alpha}^2-\text{epsilon}^2+2\,r^2\,(h-k\,r^2)}\right)}{r^2}\right]}{2\sqrt{\text{alpha}^2+\text{epsilon}^2}}$$

Problem 235: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 12 leaves, 1 step):

$$-\frac{2\,\text{Cos}[x]}{\sqrt{1+\text{Sin}[x]}}$$

Result (type 3, 40 leaves):

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

Problem 236: Result more than twice size of optimal antiderivative.

$$\int \sqrt{1-\text{Sin}[x]}\,dx$$

Optimal (type 3, 14 leaves, 1 step):

$$\frac{2\,\text{Cos}[x]}{\sqrt{1-\text{Sin}[x]}}$$

Result (type 3, 42 leaves):

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

Problem 256: Result more than twice size of optimal antiderivative.

$$\int \frac{x}{-1+x^4}\,dx$$

Optimal (type 3, 8 leaves, 2 steps):

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

Result (type 3, 23 leaves):

$$\frac{1}{4}\,\text{Log}\left[1-x^2\right]-\frac{1}{4}\,\text{Log}\left[1+x^2\right]$$

Problem 278: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{-8-8x-x^2-3x^3+7x^4+4x^5+2x^6}{\left(-1+2x^2\right)^2\sqrt{1+2x^2+4x^3+x^4}}\,dx$$

Optimal (type 3, 94 leaves, ? steps):

$$\frac{(1+2x)\sqrt{1+2x^2+4x^3+x^4}}{2\left(-1+2x^2\right)}-\text{ArcTanh}\left[\frac{x\,(2+x)\left(7-x+27x^2+33x^3\right)}{\left(2+37x^2+31x^3\right)\sqrt{1+2x^2+4x^3+x^4}}\right]$$

Result (type 4, 5137 leaves):

$$\frac{(1+2x)\sqrt{1+2x^2+4x^3+x^4}}{2\left(-1+2x^2\right)}+\Bigg(5\left(x-\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,1\right]\right)^2$$

$$\Bigg(\left(1+\frac{1}{\sqrt{2}}\right)\text{EllipticF}\Bigg[\text{ArcSin}\Bigg[\sqrt{-\frac{(1+x)\left(\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,1\right]-\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,3\right]\right)}}\Bigg],$$

$$\left(\left(\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,1\right]-\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,2\right]\right)\left(1+\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,3\right]\right)\right)\Big/$$
$$\left(\left(1+\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,2\right]\right)\left(\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,1\right]-\text{Root}\left[1-\#1+3\#1^2+\#1^3\&,3\right]\right)\right)\Bigg]-$$

$$\text{EllipticPi}\left[\frac{\left(-\frac{1}{\sqrt{2}}+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(-1-\frac{1}{\sqrt{2}}\right)\,\left(-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)},\right.$$

$$\text{ArcSin}\left[\sqrt{-\frac{(1+x)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}\,\right],$$

$$\left(\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$
$$\left.\left(\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\right]$$

$$\left.\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\right)\,\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}}$$

$$\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\sqrt{-\frac{(1+x)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\left.\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$

$$\left(2\,\left(-1-\frac{1}{\sqrt{2}}\right)\,\sqrt{1+2\,x^2+4\,x^3+x^4}\,\left(\frac{1}{\sqrt{2}}-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\right.$$
$$\left.\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)+$$

$$\left(5\,\sqrt{2}\,\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)^2\right.$$

$$\left(\left(1+\frac{1}{\sqrt{2}}\right)\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{-\frac{(1+x)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}\,\right],\right.\right.$$

$$\left(\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$
$$\left.\left(\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\right]-$$

$$\text{EllipticPi}\left[\frac{\left(-\frac{1}{\sqrt{2}}+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(-1-\frac{1}{\sqrt{2}}\right)\,\left(-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)},\right.$$

$$\text{ArcSin}\Big[\sqrt{-\frac{(1+x)\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}{(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}}\Big],$$

$$((\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3]))\,/$$
$$((1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3]))\Big]$$

$$(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\Big)\,\sqrt{\frac{(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])}{(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])}}$$

$$\sqrt{\frac{(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}{(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}}$$

$$\sqrt{-\frac{(1+x)\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}{(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}}$$

$$(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])\Big)\Big/$$

$$\Big(\Big(-1-\frac{1}{\sqrt{2}}\Big)\sqrt{1+2x^2+4x^3+x^4}\,\Big(\frac{1}{\sqrt{2}}-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]\Big)\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])$$

$$(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])\Big)+\Big(5$$

$$(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])^2$$

$$\Big(\Big(1-\frac{1}{\sqrt{2}}\Big)\,\text{EllipticF}\Big[\text{ArcSin}\Big[\sqrt{-\frac{(1+x)\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}{(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}}\Big],$$

$$((\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3]))\,/$$
$$((1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3]))\Big]-$$

$$\text{EllipticPi}\Big[\frac{\Big(\frac{1}{\sqrt{2}}+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]\Big)\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}{\Big(-1+\frac{1}{\sqrt{2}}\Big)\,(-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])},$$

$$\text{ArcSin}\Big[\sqrt{-\frac{(1+x)\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}{(x-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3])}}\Big],$$

$$((\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])\,(1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3]))\,/$$
$$((1+\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,2])\,(\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,1]-\text{Root}[1-\#1+3\#1^2+\#1^3\,\&,3]))\Big]$$

$$\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\Bigg)\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}}$$

$$\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\sqrt{-\frac{(1+x)\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\Bigg)\Bigg/$$

$$\Bigg(2\left(-1+\frac{1}{\sqrt{2}}\right)\sqrt{1+2\,x^2+4\,x^3+x^4}\left(-\frac{1}{\sqrt{2}}-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)$$

$$\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\Bigg)-$$

$$\Bigg(5\sqrt{2}\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)^2$$

$$\Bigg(\Bigg(\left(1-\frac{1}{\sqrt{2}}\right)\text{EllipticF}\Bigg[\text{ArcSin}\Bigg[\sqrt{-\frac{(1+x)\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}\Bigg],$$

$$\left(\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$
$$\left(\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Bigg]-$$

$$\text{EllipticPi}\Bigg[\frac{\left(\frac{1}{\sqrt{2}}+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(-1+\frac{1}{\sqrt{2}}\right)\left(-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)},$$

$$\text{ArcSin}\Bigg[\sqrt{-\frac{(1+x)\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}\Bigg],$$

$$\left(\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$
$$\left(\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Bigg]$$

$$\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\Bigg)\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}}$$

$$\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\sqrt{-\frac{(1+x)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\left.\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$

$$\left(\left(-1+\frac{1}{\sqrt{2}}\right)\sqrt{1+2\,x^2+4\,x^3+x^4}\,\left(-\frac{1}{\sqrt{2}}-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\right.$$

$$\left.\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)+$$

$$\left(6\,\text{EllipticF}\left[\text{ArcSin}\left[\sqrt{\frac{(1+x)\,\left(-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}\right],\right.\right.$$

$$\left(\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\,\left(-1-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\Big/$$
$$\left.\left(\left(-1-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)\,\left(\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)\right]$$

$$\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)^2\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,2\right]\right)}}$$

$$\left(-1-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)$$

$$\sqrt{\frac{\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}$$

$$\left.\sqrt{\frac{(1+x)\,\left(-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}{\left(x-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)}}\right)\Big/$$

$$\left(\sqrt{1+2\,x^2+4\,x^3+x^4}\,\left(1+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]\right)\,\left(-\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,1\right]+\text{Root}\left[1-\#1+3\,\#1^2+\#1^3\,\&,\,3\right]\right)\right)$$

Problem 279: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{(1+2y)\sqrt{1-5y-5y^2}}{y(1+y)(2+y)\sqrt{1-y-y^2}}\,dy$$

Optimal (type 3, 142 leaves, ? steps):

$$-\frac{1}{4}\text{ArcTanh}\left[\frac{(1-3y)\sqrt{1-5y-5y^2}}{(1-5y)\sqrt{1-y-y^2}}\right]-\frac{1}{2}\text{ArcTanh}\left[\frac{(4+3y)\sqrt{1-5y-5y^2}}{(6+5y)\sqrt{1-y-y^2}}\right]+\frac{9}{4}\text{ArcTanh}\left[\frac{(11+7y)\sqrt{1-5y-5y^2}}{3(7+5y)\sqrt{1-y-y^2}}\right]$$

Result (type 4, 630 leaves):

$$\frac{1}{16\sqrt{1-5y-5y^2}\sqrt{1-y-y^2}}\left(-1-\frac{2}{\sqrt{5}}\right)\left(1+\sqrt{5}+2y\right)^2\sqrt{\frac{5+3\sqrt{5}+10y}{5+5\sqrt{5}+10y}}$$
$$\left(20\left(-4\sqrt{\frac{-5+3\sqrt{5}-10y}{1+\sqrt{5}+2y}}\sqrt{\frac{-1+\sqrt{5}-2y}{1+\sqrt{5}+2y}}+\sqrt{5}\sqrt{\frac{-5+3\sqrt{5}-10y}{1+\sqrt{5}+2y}}\sqrt{\frac{-1+\sqrt{5}-2y}{1+\sqrt{5}+2y}}+5\sqrt{-\frac{-5+\sqrt{5}+2\sqrt{5}\,y}{1+\sqrt{5}+2y}}\sqrt{-\frac{-3+\sqrt{5}+2\sqrt{5}\,y}{1+\sqrt{5}+2y}}-\right.\right.$$
$$\left.2\sqrt{5}\sqrt{-\frac{-5+\sqrt{5}+2\sqrt{5}\,y}{1+\sqrt{5}+2y}}\sqrt{-\frac{-3+\sqrt{5}+2\sqrt{5}\,y}{1+\sqrt{5}+2y}}\right)\text{EllipticF}\left[\text{ArcSin}\left[\frac{2\sqrt{\frac{5+3\sqrt{5}+10y}{1+\sqrt{5}+2y}}}{\sqrt{15}}\right],\frac{15}{16}\right]+$$
$$\sqrt{\frac{-5+3\sqrt{5}-10y}{1+\sqrt{5}+2y}}\sqrt{\frac{-1+\sqrt{5}-2y}{1+\sqrt{5}+2y}}\left(9\sqrt{5}\,\text{EllipticPi}\left[\frac{5}{8}-\frac{\sqrt{5}}{8},\text{ArcSin}\left[\frac{2\sqrt{\frac{5+3\sqrt{5}+10y}{1+\sqrt{5}+2y}}}{\sqrt{15}}\right],\frac{15}{16}\right]+\left(-20+9\sqrt{5}\right)\right.$$
$$\left.\left.\text{EllipticPi}\left[-\frac{3}{8}\left(-5+\sqrt{5}\right),\text{ArcSin}\left[\frac{2\sqrt{\frac{5+3\sqrt{5}+10y}{1+\sqrt{5}+2y}}}{\sqrt{15}}\right],\frac{15}{16}\right]+2\sqrt{5}\,\text{EllipticPi}\left[\frac{3}{8}\left(5+\sqrt{5}\right),\text{ArcSin}\left[\frac{2\sqrt{\frac{5+3\sqrt{5}+10y}{1+\sqrt{5}+2y}}}{\sqrt{15}}\right],\frac{15}{16}\right]\right)\right)$$

Problem 280: Result more than twice size of optimal antiderivative.

$$\int \frac{x\left(-\sqrt{-4+x^2}+x^2\sqrt{-4+x^2}-4\sqrt{-1+x^2}+x^2\sqrt{-1+x^2}\right)}{\left(4-5x^2+x^4\right)\left(1+\sqrt{-4+x^2}+\sqrt{-1+x^2}\right)}\,dx$$

Optimal (type 3, 21 leaves, 1 step):

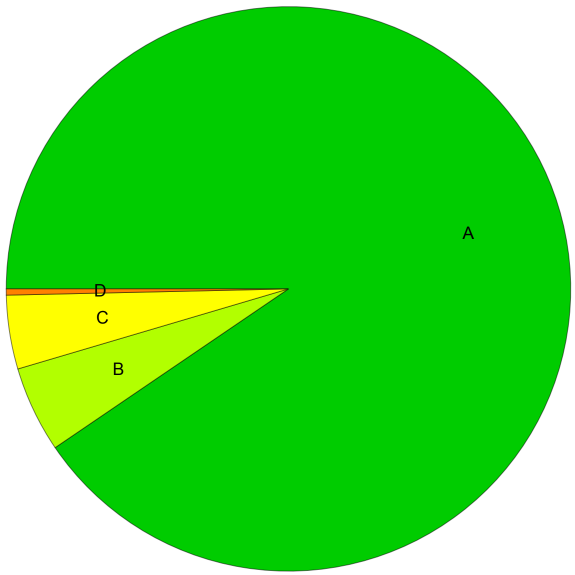
$$\text{Log}\left[1+\sqrt{-4+x^2}+\sqrt{-1+x^2}\right]$$

Result (type 3, 97 leaves):

$$-\frac{1}{2}\,\text{ArcTanh}\left[\sqrt{-4+x^2}\right]+\frac{1}{2}\,\text{ArcTanh}\left[\frac{1}{2}\sqrt{-1+x^2}\right]+\frac{1}{4}\,\text{Log}\left[17-5\,x^2-4\,\sqrt{-4+x^2}\,\sqrt{-1+x^2}\right]+\frac{1}{4}\,\text{Log}\left[5-2\,x^2-2\,\sqrt{-4+x^2}\,\sqrt{-1+x^2}\right]$$

Summary of Integration Test Results

284 integration problems



A - 257 optimal antiderivatives

B - 14 more than twice size of optimal antiderivatives

C - 12 unnecessarily complex antiderivatives

D - 1 unable to integrate problems

E - 0 integration timeouts