Mathematica 11.3 Integration Test Results

Test results for the 50 problems in "Charlwood Problems.m"

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

$$\int -\text{ArcSin}\left[\sqrt{x}-\sqrt{1+x}\right]\,dx$$

Optimal (type 3, 69 leaves, ? steps):

$$\frac{\left(\sqrt{x}+3\sqrt{1+x}\right)\sqrt{-x+\sqrt{x}\,\sqrt{1+x}}}{4\sqrt{2}}-\left(\frac{3}{8}+x\right)\text{ArcSin}\left[\sqrt{x}-\sqrt{1+x}\right]$$

Result (type 3, 205 leaves) :

$$-x\,\text{ArcSin}\left[\sqrt{x}-\sqrt{1+x}\right]-\left((1+x)\left(1+2x-2\sqrt{x}\,\sqrt{1+x}\right)^2\left(2\sqrt{-x+\sqrt{x}\,\sqrt{1+x}}\left(-3-2x+2\sqrt{x}\,\sqrt{1+x}\right)+3\sqrt{-2-4x+4\sqrt{x}\,\sqrt{1+x}}\,\text{Log}\left[2\sqrt{-x+\sqrt{x}\,\sqrt{1+x}}+\sqrt{-2-4x+4\sqrt{x}\,\sqrt{1+x}}\right]\right)\right)\Big/\left(8\sqrt{2}\left(-\sqrt{x}+\sqrt{1+x}\right)^3\left(1+x-\sqrt{x}\,\sqrt{1+x}\right)^2\right)$$

Problem 5: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\text{Cos}[x]^2}{\sqrt{1+\text{Cos}[x]^2+\text{Cos}[x]^4}}\,dx$$

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

$$\frac{x}{3}+\frac{1}{3}\text{ArcTan}\left[\frac{\text{Cos}[x]\left(1+\text{Cos}[x]^2\right)\text{Sin}[x]}{1+\text{Cos}[x]^2\sqrt{1+\text{Cos}[x]^2+\text{Cos}[x]^4}}\right]$$

Result (type 4, 159 leaves) :

$$-\frac{2\,i\,\text{Cos}[x]^2\,\text{EllipticPi}\left[\frac{3}{2}+\frac{i\sqrt{3}}{2},\ i\,\text{ArcSinh}\left[\sqrt{-\frac{2\,i}{-3\,i+\sqrt{3}}}\ \text{Tan}[x]\right],\ \frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]\sqrt{1-\frac{2\,i\,\text{Tan}[x]^2}{-3\,i+\sqrt{3}}}\ \sqrt{1+\frac{2\,i\,\text{Tan}[x]^2}{3\,i+\sqrt{3}}}}{\sqrt{-\frac{i}{-3\,i+\sqrt{3}}}\ \sqrt{15+8\,\text{Cos}[2\,x]+\text{Cos}[4\,x]}}$$

Problem 6: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \text{Tan}[x]\,\sqrt{1+\text{Tan}[x]^4}\,dx$$

Optimal (type 3, 56 leaves, 7 steps):

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

Result (type 4, 7083 leaves):

$$\frac{1}{2}\sqrt{1+\text{Tan}[x]^4}\ -$$

$$\Bigg(4\,\text{Cos}[x]^2\Bigg(\left((2+6\,i)-\frac{8}{\sqrt{-1-i}}-5\sqrt{-1+i}+(2+4\,i)\sqrt{2}\right)\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],\ 4-2\sqrt{2}\right]+$$

$$\left((-4-4\,i)-(3-5\,i)\sqrt{-1-i}+(5-3\,i)\sqrt{-1+i}+4\,(-1-i)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left((-1+i)+\sqrt{-1-i}\right)}{\left((-1-i)+\sqrt{-1+i}\right)\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\ \text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],\ 4-2\sqrt{2}\right]+$$

$$\left((-4-4\,i)-(1-4\,i)\sqrt{-1-i}+(4-i)\sqrt{-1+i}+2\,(-1-i)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left(i+\sqrt{-1-i}\right)}{\left(-i+\sqrt{-1+i}\right)\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\ \text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],\ 4-2\sqrt{2}\right]\Bigg)$$

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

$$\left.\sqrt{-\frac{\left(1-i\right)\left(\left(-1+2\,i\right)+2\sqrt{-1-i}\right)\left(1-\left(2+4\,i\right)\text{Tan}\left[\frac{x}{2}\right]^2+\text{Tan}\left[\frac{x}{2}\right]^4\right)}{\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}}\;\left(\frac{2\,\text{Sec}[x]\,\text{Sin}[3\,x]}{\sqrt{3+\text{Cos}[4\,x]}}-\frac{2\,\text{Tan}[x]}{\sqrt{3+\text{Cos}[4\,x]}}\right)\sqrt{1+\text{Tan}[x]^4}\right)\Big/$$

$$\left(\sqrt{-1+i}\;\left(\left(-12+4\,i\right)+\left(7+8\,i\right)\sqrt{-1-i}\right)\left(\left(2+2\,i\right)-\left(2-i\right)\sqrt{-1+i}\right)\sqrt{3+\text{Cos}[4\,x]}\right.$$

$$\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2\sqrt{\frac{1-4\,\text{Tan}\left[\frac{x}{2}\right]^2+22\,\text{Tan}\left[\frac{x}{2}\right]^4-4\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}$$

$$\left(-\left(\left(8\left(\left(\left(2+6\,i\right)-\frac{8}{\sqrt{-1-i}}-5\sqrt{-1+i}+\left(2+4\,i\right)\sqrt{2}\right)\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],4-2\sqrt{2}\right]+\right.\right.\right.\right.$$

$$\left(\left(-4-4\,i\right)-\left(3-5\,i\right)\sqrt{-1-i}+\left(5-3\,i\right)\sqrt{-1+i}+4\left(-1-i\right)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left(\left(-1+i\right)+\sqrt{-1-i}\right)}{\left(\left(-1-i\right)+\sqrt{-1+i}\right)\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],4-2\sqrt{2}\right]+$$

$$\left(\left(-4-4\,i\right)-\left(1-4\,i\right)\sqrt{-1-i}+\left(4-i\right)\sqrt{-1+i}+2\left(-1-i\right)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\Big[\frac{2\sqrt{-1+\mathrm{i}}\,\left(\mathrm{i}+\sqrt{-1-\mathrm{i}}\right)}{\left(-\mathrm{i}+\sqrt{-1+\mathrm{i}}\right)\left(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\right)},\ \text{ArcSin}\Big[\frac{\sqrt{\frac{\left(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\right)\left((-1-2\,\mathrm{i})+2\sqrt{-1+\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+\mathrm{i}}\left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]\Bigg)$$

$$\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]\sqrt{\frac{\left(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}-\sqrt{-1+\mathrm{i}}\right)\left((1-2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}-\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(-2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\right)\left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}\ \left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)$$

$$\sqrt{-\frac{(1-\mathrm{i})\left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}\right)\left(1-(2+4\,\mathrm{i})\,\text{Tan}\left[\frac{x}{2}\right]^2+\text{Tan}\left[\frac{x}{2}\right]^4\right)}{\left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}}\ \Bigg)\Big/\Bigg(\sqrt{-1+\mathrm{i}}\ \left((-12+4\,\mathrm{i})+(7+8\,\mathrm{i})\sqrt{-1-\mathrm{i}}\right)$$

$$\left((2+2\,\mathrm{i})-(2-\mathrm{i})\sqrt{-1+\mathrm{i}}\right)\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2\sqrt{\frac{1-4\,\text{Tan}\left[\frac{x}{2}\right]^2+22\,\text{Tan}\left[\frac{x}{2}\right]^4-4\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\ \Bigg)+$$

$$\Bigg(8\Bigg(\left((2+6\,\mathrm{i})-\frac{8}{\sqrt{-1-\mathrm{i}}}-5\sqrt{-1+\mathrm{i}}+(2+4\,\mathrm{i})\sqrt{2}\right)\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{\left(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\right)\left((-1-2\,\mathrm{i})+2\sqrt{-1+\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+\mathrm{i}}\left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]+$$

$$\left((-4-4\,\mathrm{i})-(3-5\,\mathrm{i})\sqrt{-1-\mathrm{i}}+(5-3\,\mathrm{i})\sqrt{-1+\mathrm{i}}+4\,(-1-\mathrm{i})^{3/2}\sqrt{-1+\mathrm{i}}\right)$$

$$\text{EllipticPi}\Big[\frac{2\sqrt{-1+\mathrm{i}}\,\left((-1+\mathrm{i})+\sqrt{-1-\mathrm{i}}\right)}{\left((-1-\mathrm{i})+\sqrt{-1+\mathrm{i}}\right)\left(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\right)},\ \text{ArcSin}\Big[\frac{\sqrt{\frac{\left(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\right)\left((-1-2\,\mathrm{i})+2\sqrt{-1+\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+\mathrm{i}}\left((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]+$$

$$\left((-4-4\,\mathrm{i})-(1-4\,\mathrm{i})\sqrt{-1-\mathrm{i}}+(4-\mathrm{i})\sqrt{-1+\mathrm{i}}+2\,(-1-\mathrm{i})^{3/2}\sqrt{-1+\mathrm{i}}\right)$$

$$\text{EllipticPi}\Big[\frac{2\sqrt{-1+\mathrm{i}}\,\big(\mathrm{i}+\sqrt{-1-\mathrm{i}}\big)}{\big(-\mathrm{i}+\sqrt{-1+\mathrm{i}}\big)\big(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\big)},\ \text{ArcSin}\Big[\frac{\sqrt{\frac{\big(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\big)\big((-1-2\,\mathrm{i})+2\sqrt{-1+\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}{\sqrt{-1+\mathrm{i}}\,\big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]\Bigg)$$

$$\text{Sec}\Big[\frac{x}{2}\Big]^2\,\text{Tan}\Big[\frac{x}{2}\Big]\sqrt{\frac{\big(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}-\sqrt{-1+\mathrm{i}}\big)\big((1-2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}-\text{Tan}[\frac{x}{2}]^2\big)}{\big(-2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\big)\big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}}\ \Big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}\Big[\frac{x}{2}\Big]^2\Big)^2$$

$$\sqrt{-\frac{(1-\mathrm{i})\big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}\big)\big(1-(2+4\,\mathrm{i})\,\text{Tan}[\frac{x}{2}]^2+\text{Tan}[\frac{x}{2}]^4\big)}{\big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)^2}}\ \Bigg)\Bigg/\Bigg(\sqrt{-1+\mathrm{i}}\,\Big((-12+4\,\mathrm{i})+(7+8\,\mathrm{i})\sqrt{-1-\mathrm{i}}\Big)$$

$$\Big((2+2\,\mathrm{i})-(2-\mathrm{i})\sqrt{-1+\mathrm{i}}\Big)\Big(1+\text{Tan}\Big[\frac{x}{2}\Big]^2\Big)^3\sqrt{\frac{1-4\,\text{Tan}[\frac{x}{2}]^2+22\,\text{Tan}[\frac{x}{2}]^4-4\,\text{Tan}[\frac{x}{2}]^6+\text{Tan}[\frac{x}{2}]^8}{\big(1+\text{Tan}[\frac{x}{2}]^2\big)^4}}\ \Bigg)-$$

$$\Bigg(2\Bigg(\Big((2+6\,\mathrm{i})-\frac{8}{\sqrt{-1-\mathrm{i}}}-5\sqrt{-1+\mathrm{i}}+(2+4\,\mathrm{i})\sqrt{2}\Big)\,\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{\big(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\big)\big((-1-2\,\mathrm{i})+2\sqrt{-1+\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}{\sqrt{-1+\mathrm{i}}\,\big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]+$$

$$\Big((-4-4\,\mathrm{i})-(3-5\,\mathrm{i})\sqrt{-1-\mathrm{i}}+(5-3\,\mathrm{i})\sqrt{-1+\mathrm{i}}+4\,(-1-\mathrm{i})^{3/2}\sqrt{-1+\mathrm{i}}\Big)$$

$$\text{EllipticPi}\Big[\frac{2\sqrt{-1+\mathrm{i}}\,\big((-1+\mathrm{i})+\sqrt{-1-\mathrm{i}}\big)}{\big((-1-\mathrm{i})+\sqrt{-1+\mathrm{i}}\big)\big(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\big)},\ \text{ArcSin}\Big[\frac{\sqrt{\frac{\big(2\,\mathrm{i}+\sqrt{-1-\mathrm{i}}+\sqrt{-1+\mathrm{i}}\big)\big((-1-2\,\mathrm{i})+2\sqrt{-1+\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}{\sqrt{-1+\mathrm{i}}\,\big((-1+2\,\mathrm{i})+2\sqrt{-1-\mathrm{i}}+\text{Tan}[\frac{x}{2}]^2\big)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]+$$

$$\Big((-4-4\,\mathrm{i})-(1-4\,\mathrm{i})\sqrt{-1-\mathrm{i}}+(4-\mathrm{i})\sqrt{-1+\mathrm{i}}+2\,(-1-\mathrm{i})^{3/2}\sqrt{-1+\mathrm{i}}\Big)$$

$$\text{EllipticPi}\Big[\frac{2\sqrt{-1+i}\,\left(i+\sqrt{-1-i}\right)}{\left(-i+\sqrt{-1+i}\right)\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\ \text{ArcSin}\Big[\frac{\sqrt{\frac{\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]\Bigg)$$

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

$$\left(-\frac{\left(2i+\sqrt{-1-i}-\sqrt{-1+i}\right)\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]\left((1-2i)+2\sqrt{-1-i}-\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(-2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}-\right.$$

$$\left.\left.\frac{\left(2i+\sqrt{-1-i}-\sqrt{-1+i}\right)\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]}{\left(-2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}\right)\right)\Big/$$

$$\left(\sqrt{-1+i}\left((-12+4i)+(7+8i)\sqrt{-1-i}\right)\left((2+2i)-(2-i)\sqrt{-1+i}\right)\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2\right.$$

$$\left.\sqrt{\frac{\left(2i+\sqrt{-1-i}-\sqrt{-1+i}\right)\left((1-2i)+2\sqrt{-1-i}-\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(-2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}\sqrt{\frac{1-4\,\text{Tan}\left[\frac{x}{2}\right]^2+22\,\text{Tan}\left[\frac{x}{2}\right]^4-4\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\right)-$$

$$\left(2\left(\left((2+6i)-\frac{8}{\sqrt{-1-i}}-5\sqrt{-1+i}+(2+4i)\sqrt{2}\right)\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{\sqrt{\frac{\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\Big],\ 4-2\sqrt{2}\Big]+\right.\right.$$

$$\left((-4-4i)-(3-5i)\sqrt{-1-i}+(5-3i)\sqrt{-1+i}+4(-1-i)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left((-1+i)+\sqrt{-1-i}\right)}{\left((-1-i)+\sqrt{-1+i}\right)\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\ \text{ArcSin}\left[\frac{\sqrt{\frac{\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],\ 4-2\sqrt{2}\right]+$$

$$\left(\left(-4-4i\right)-\left(1-4i\right)\sqrt{-1-i}+\left(4-i\right)\sqrt{-1+i}+2\left(-1-i\right)^{3/2}\sqrt{-1+i}\right)$$

$$\left.\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left(i+\sqrt{-1-i}\right)}{\left(-i+\sqrt{-1+i}\right)\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\ \text{ArcSin}\left[\frac{\sqrt{\frac{\left(2i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],\ 4-2\sqrt{2}\right]\right)$$

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

$$\left(-\frac{(1-i)\left((-1+2i)+2\sqrt{-1-i}\right)\left((-2-4i)\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]+2\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^3\right)}{\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}+\right.$$

$$\left.\frac{(2-2i)\left((-1+2i)+2\sqrt{-1-i}\right)\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]\left(1-(2+4i)\,\text{Tan}\left[\frac{x}{2}\right]^2+\text{Tan}\left[\frac{x}{2}\right]^4\right)}{\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)^3}\right)\Bigg)\Bigg/$$

$$\left(\sqrt{-1+i}\left((-12+4i)+(7+8i)\sqrt{-1-i}\right)\left((2+2i)-(2-i)\sqrt{-1+i}\right)\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2\right.$$

$$\left.\sqrt{-\frac{(1-i)\left((-1+2i)+2\sqrt{-1-i}\right)\left(1-(2+4i)\,\text{Tan}\left[\frac{x}{2}\right]^2+\text{Tan}\left[\frac{x}{2}\right]^4\right)}{\left((-1+2i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}}\sqrt{\frac{1-4\,\text{Tan}\left[\frac{x}{2}\right]^2+22\,\text{Tan}\left[\frac{x}{2}\right]^4-4\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\right)+$$

$$\Bigg(2\Bigg(\left((2+6\,i)-\frac{8}{\sqrt{-1-i}}-5\sqrt{-1+i}+(2+4\,i)\sqrt{2}\right)\text{EllipticF}\left[\text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],4-2\sqrt{2}\right]+$$

$$\left((-4-4\,i)-(3-5\,i)\sqrt{-1-i}+(5-3\,i)\sqrt{-1+i}+4(-1-i)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left((-1+i)+\sqrt{-1-i}\right)}{\left((-1-i)+\sqrt{-1+i}\right)\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],4-2\sqrt{2}\right]+$$

$$\left((-4-4\,i)-(1-4\,i)\sqrt{-1-i}+(4-i)\sqrt{-1+i}+2(-1-i)^{3/2}\sqrt{-1+i}\right)$$

$$\text{EllipticPi}\left[\frac{2\sqrt{-1+i}\left(i+\sqrt{-1-i}\right)}{\left(-i+\sqrt{-1+i}\right)\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)},\text{ArcSin}\left[\frac{\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\text{Tan}\left[\frac{x}{2}\right]^2\right)}}}{\sqrt{2}}\right],4-2\sqrt{2}\right]\Bigg)$$

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

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

$$\left(\frac{-4\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]+44\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^3-12\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^5+4\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^7}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}-\right.$$

$$\left.\frac{4\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]\left(1-4\,\text{Tan}\left[\frac{x}{2}\right]^2+22\,\text{Tan}\left[\frac{x}{2}\right]^4-4\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8\right)}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^5}\right)\Bigg)\Big/\left(\sqrt{-1+i}\left((-12+4\,i)+(7+8\,i)\sqrt{-1-i}\right)\right.$$

$$\left(\left((2+2\,i)-(2-i)\sqrt{-1+i}\right)\left(1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2\left(\frac{1-4\,\mathrm{Tan}\left[\frac{x}{2}\right]^2+22\,\mathrm{Tan}\left[\frac{x}{2}\right]^4-4\,\mathrm{Tan}\left[\frac{x}{2}\right]^6+\mathrm{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^4}\right)^{3/2}\right)-$$

$$\left(4\sqrt{\frac{\left(2\,i+\sqrt{-1-i}-\sqrt{-1+i}\right)\left((1-2\,i)+2\sqrt{-1-i}-\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(-2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2\right.$$

$$\sqrt{-\frac{(1-i)\left((-1+2\,i)+2\sqrt{-1-i}\right)\left(1-(2+4\,i)\,\mathrm{Tan}\left[\frac{x}{2}\right]^2+\mathrm{Tan}\left[\frac{x}{2}\right]^4\right)}{\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2}}$$

$$\left(\left(\left((2+6\,i)-\frac{8}{\sqrt{-1-i}}-5\sqrt{-1+i}+(2+4\,i)\sqrt{2}\right)\left(\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}-\right.\right.\right.$$

$$\left.\left.\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]\left((-1-2\,i)+2\sqrt{-1+i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2}\right)\right)\Big/$$

$$\left(2\sqrt{2}\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}}\right.$$

$$\sqrt{1-\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}}$$

$$\left.\sqrt{1-\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(4-2\sqrt{2}\right)\left((-1-2\,i)+2\sqrt{-1+i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}}\right)+$$

$$\left(\left((-4-4\,i)-(3-5\,i)\sqrt{-1-i}+(5-3\,i)\sqrt{-1+i}+4\,(-1-i)^{3/2}\sqrt{-1+i}\right)\left(\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}-\right.\right.$$

$$\left.\left.\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]\left((-1-2\,i)+2\sqrt{-1+i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left((-1+2\,i)+2\sqrt{-1-i}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2}\right)\right)\Big/\left(2\sqrt{2}\right.$$

$$\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}}\left(1-\frac{\left(\left(-1+i\right)+\sqrt{-1-i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(\left(-1-i\right)+\sqrt{-1+i}\right)\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}\right)$$

$$\sqrt{1-\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{2\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}}$$

$$\left.\sqrt{1-\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(4-2\sqrt{2}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{2\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}}\right)+$$

$$\left(\left(\left(-4-4\,i\right)-\left(1-4\,i\right)\sqrt{-1-i}+\left(4-i\right)\sqrt{-1+i}+2\left(-1-i\right)^{3/2}\sqrt{-1+i}\right)\left(\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\operatorname{Sec}\left[\frac{x}{2}\right]^2\operatorname{Tan}\left[\frac{x}{2}\right]}{\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}-\right.\right.$$

$$\left.\left.\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\operatorname{Sec}\left[\frac{x}{2}\right]^2\operatorname{Tan}\left[\frac{x}{2}\right]\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)^2}\right)\right)\Bigg/$$

$$\left(2\sqrt{2}\sqrt{\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}}\left(1-\frac{\left(i+\sqrt{-1-i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(-i+\sqrt{-1+i}\right)\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}\right)\right.$$

$$\sqrt{1-\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{2\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}}$$

$$\left.\left.\left.\sqrt{1-\frac{\left(2\,i+\sqrt{-1-i}+\sqrt{-1+i}\right)\left(4-2\sqrt{2}\right)\left(\left(-1-2\,i\right)+2\sqrt{-1+i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}{2\sqrt{-1+i}\left(\left(-1+2\,i\right)+2\sqrt{-1-i}+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)}}\right)\right)\right)\Bigg/$$

$$\left(\sqrt{-1+i}\left(\left(-12+4\,i\right)+\left(7+8\,i\right)\sqrt{-1-i}\right)\left(\left(2+2\,i\right)-\left(2-i\right)\sqrt{-1+i}\right)\left(1+\operatorname{Tan}\left[\frac{x}{2}\right]^2\right)^2\right.$$

$$\left.\left.\sqrt{\frac{1-4\,\text{Tan}\left[\frac{x}{2}\right]^2+22\,\text{Tan}\left[\frac{x}{2}\right]^4-4\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\,\right)\right)$$

Problem 7: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\text{Tan}[x]}{\sqrt{1+\text{Sec}[x]^3}}\,dx$$

Optimal (type 3, 15 leaves, 4 steps):

$$-\frac{2}{3}\,\text{ArcTanh}\left[\sqrt{1+\text{Sec}[x]^3}\,\right]$$

Result (type 4, 3292 leaves):

$$-\left(\left(\text{i}\,\text{Cos}[x]^2\left(\text{EllipticF}\left[\text{i}\,\text{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{\text{i}\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,\text{i}+\sqrt{3}}}\,\right],\frac{3\,\text{i}-\sqrt{3}}{3\,\text{i}+\sqrt{3}}\right]-\right.\right.\right.$$

$$\left.\text{EllipticPi}\left[\frac{1}{6}\left(3+\text{i}\,\sqrt{3}\right),\text{i}\,\text{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{\text{i}\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,\text{i}+\sqrt{3}}}\,\right],\frac{3\,\text{i}-\sqrt{3}}{3\,\text{i}+\sqrt{3}}\right]\right)\text{Sec}\left[\frac{x}{2}\right]^4\sqrt{\left(4+3\,\text{Cos}[x]+\text{Cos}[3\,x]\right)\,\text{Sec}[x]^3}$$

$$\left(-\frac{\sqrt{\frac{4}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}+\frac{3\,\text{Cos}[x]}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}+\frac{\text{Cos}[3\,x]}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}}\,\text{Sec}\left[\frac{x}{2}\right]\,\text{Sin}\left[\frac{3\,x}{2}\right]}{2\left(3-2\,\text{Cos}[x]+\text{Cos}[2\,x]\right)}+\frac{\sqrt{\frac{4}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}+\frac{3\,\text{Cos}[x]}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}+\frac{\text{Cos}[3\,x]}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}}\,\text{Sec}\left[\frac{x}{2}\right]\,\text{Sin}\left[\frac{5\,x}{2}\right]}{2\left(3-2\,\text{Cos}[x]+\text{Cos}[2\,x]\right)}+\right.$$

$$\left.\left.\frac{\sqrt{\frac{4}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}+\frac{3\,\text{Cos}[x]}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}+\frac{\text{Cos}[3\,x]}{3\,\text{Cos}[x]+\text{Cos}[3\,x]}}\,\text{Tan}\left[\frac{x}{2}\right]}{3-2\,\text{Cos}[x]+\text{Cos}[2\,x]}\right)\sqrt{\frac{\sqrt{3}-3\,\text{i}\,\text{Tan}\left[\frac{x}{2}\right]^2}{-3\,\text{i}+\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}+3\,\text{i}\,\text{Tan}\left[\frac{x}{2}\right]^2}{3\,\text{i}+\sqrt{3}}}\,\right)\Big/$$

$$\Bigg(\sqrt{3}\,\sqrt{\frac{\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\,\left(1+3\,\mathrm{Tan}\left[\frac{x}{2}\right]^4\right)\Bigg)\Bigg(\Bigg(2\,i\,\sqrt{3}\,\mathrm{Cos}[x]^2\,\Bigg(\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{i\,\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]-$$

$$\mathrm{EllipticPi}\left[\frac{1}{6}\left(3+i\sqrt{3}\right),\,i\,\mathrm{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{i\,\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]\Bigg)\,\mathrm{Sec}\left[\frac{x}{2}\right]^6\sqrt{\left(4+3\,\mathrm{Cos}[x]+\mathrm{Cos}[3\,x]\right)\,\mathrm{Sec}[x]^3}$$

$$\mathrm{Tan}\left[\frac{x}{2}\right]^3\sqrt{\frac{\sqrt{3}-3\,i\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}+3\,i\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}{3\,i+\sqrt{3}}}\Bigg)\Big/\Bigg(\sqrt{\frac{\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\,\left(1+3\,\mathrm{Tan}\left[\frac{x}{2}\right]^4\right)^2\Bigg)+$$

$$\Bigg(\sqrt{3}\,\mathrm{Cos}[x]^2\,\Bigg(\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{i\,\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]-\mathrm{EllipticPi}\Bigg[\frac{1}{6}\left(3+i\sqrt{3}\right),$$

$$i\,\mathrm{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{i\,\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\Bigg]\Bigg)\,\mathrm{Sec}\left[\frac{x}{2}\right]^6\sqrt{\left(4+3\,\mathrm{Cos}[x]+\mathrm{Cos}[3\,x]\right)\,\mathrm{Sec}[x]^3}$$

$$\mathrm{Tan}\left[\frac{x}{2}\right]\sqrt{\frac{\sqrt{3}-3\,i\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\Bigg)\Big/\Bigg(2\left(3\,i+\sqrt{3}\right)\sqrt{\frac{\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}+3\,i\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}{3\,i+\sqrt{3}}}\,\left(1+3\,\mathrm{Tan}\left[\frac{x}{2}\right]^4\right)\Bigg)-$$

$$\Bigg(\sqrt{3}\,\mathrm{Cos}[x]^2\,\Bigg(\mathrm{EllipticF}\left[i\,\mathrm{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{i\,\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]-\mathrm{EllipticPi}\Bigg[\frac{1}{6}\left(3+i\sqrt{3}\right),$$

$$i\,\mathrm{ArcSinh}\left[\sqrt{3}\,\sqrt{\frac{i\,\mathrm{Cos}[x]\,\mathrm{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\Bigg]\Bigg)\,\mathrm{Sec}\left[\frac{x}{2}\right]^6\sqrt{\left(4+3\,\mathrm{Cos}[x]+\mathrm{Cos}[3\,x]\right)\,\mathrm{Sec}[x]^3}\;\mathrm{Tan}\left[\frac{x}{2}\right]\sqrt{\frac{\sqrt{3}+3\,i\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}{3\,i+\sqrt{3}}}\Bigg)\Big/$$

$$\left(2\left(-3\,i+\sqrt{3}\right)\sqrt{\frac{\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}-3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\,\left(1+3\,\text{Tan}\left[\frac{x}{2}\right]^4\right)\right)+\left(2\,i\,\text{Cos}[x]\,\left(\text{EllipticF}\right[\right.\right.$$

$$i\,\text{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\Big]-\text{EllipticPi}\left[\frac{1}{6}\left(3+i\sqrt{3}\right),\,i\,\text{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]\Bigg)$$

$$\text{Sec}\left[\frac{x}{2}\right]^4\sqrt{\left(4+3\,\text{Cos}[x]+\text{Cos}[3\,x]\right)\,\text{Sec}[x]^3}\,\text{Sin}[x]\,\sqrt{\frac{\sqrt{3}-3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}+3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{3\,i+\sqrt{3}}}\Bigg)\Big/$$

$$\left(\sqrt{3}\sqrt{\frac{\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\,\left(1+3\,\text{Tan}\left[\frac{x}{2}\right]^4\right)\right)-\Bigg(2\,i\,\text{Cos}[x]^2\,\Bigg(\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]-$$

$$\text{EllipticPi}\left[\frac{1}{6}\left(3+i\sqrt{3}\right),\,i\,\text{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]\Bigg)\,\text{Sec}\left[\frac{x}{2}\right]^4\sqrt{\left(4+3\,\text{Cos}[x]+\text{Cos}[3\,x]\right)\,\text{Sec}[x]^3}$$

$$\text{Tan}\left[\frac{x}{2}\right]\sqrt{\frac{\sqrt{3}-3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}+3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{3\,i+\sqrt{3}}}\Bigg)\Big/\left(\sqrt{3}\sqrt{\frac{\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\,\left(1+3\,\text{Tan}\left[\frac{x}{2}\right]^4\right)\right)+$$

$$\Bigg(i\,\text{Cos}[x]^2\,\Bigg(\text{EllipticF}\left[i\,\text{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\right]-\text{EllipticPi}\Big[\frac{1}{6}\left(3+i\sqrt{3}\right),$$

$$i\,\text{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i\,\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\right],\frac{3\,i-\sqrt{3}}{3\,i+\sqrt{3}}\Big]\Bigg)\,\text{Sec}\left[\frac{x}{2}\right]^4\sqrt{\left(4+3\,\text{Cos}[x]+\text{Cos}[3\,x]\right)\,\text{Sec}[x]^3}\,\Bigg(-\frac{\text{Sec}\left[\frac{x}{2}\right]^2\,\text{Sin}[x]}{-3-i\sqrt{3}}+$$

$$\frac{\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2\,\text{Tan}\left[\frac{x}{2}\right]}{-3-i\sqrt{3}}\Bigg)\sqrt{\frac{\sqrt{3}-3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{-3\,i+\sqrt{3}}}\,\sqrt{\frac{\sqrt{3}+3\,i\,\text{Tan}\left[\frac{x}{2}\right]^2}{3\,i+\sqrt{3}}}\Bigg)\Big/\left(2\sqrt{3}\left(\frac{\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}\right)^{3/2}\left(1+3\,\text{Tan}\left[\frac{x}{2}\right]^4\right)\right)-$$

$$\left(i \operatorname{Cos}[x]^2 \operatorname{Sec}\left[\frac{x}{2}\right]^4 \sqrt{(4+3\operatorname{Cos}[x]+\operatorname{Cos}[3x])\operatorname{Sec}[x]^3} \sqrt{\frac{\sqrt{3}-3 i \operatorname{Tan}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}} \sqrt{\frac{\sqrt{3}+3 i \operatorname{Tan}\left[\frac{x}{2}\right]^2}{3 i+\sqrt{3}}}\right.$$

$$\left(\frac{i\sqrt{3}\left(-\frac{i \operatorname{Sec}\left[\frac{x}{2}\right]^2 \operatorname{Sin}[x]}{-3 i+\sqrt{3}}+\frac{i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2 \operatorname{Tan}\left[\frac{x}{2}\right]}{-3 i+\sqrt{3}}\right)}{2\sqrt{\frac{i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}\sqrt{1+\frac{3 i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}\sqrt{1+\frac{3 i\left(3 i-\sqrt{3}\right)\operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{\left(-3 i+\sqrt{3}\right)\left(3 i+\sqrt{3}\right)}}} - \left(i\sqrt{3}\left(-\frac{i \operatorname{Sec}\left[\frac{x}{2}\right]^2 \operatorname{Sin}[x]}{-3 i+\sqrt{3}}+\frac{i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2 \operatorname{Tan}\left[\frac{x}{2}\right]}{-3 i+\sqrt{3}}\right)\right)\Big/\right.$$

$$\left.\left(2\sqrt{\frac{i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}\sqrt{1+\frac{3 i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}\left(1+\frac{i\left(3+i\sqrt{3}\right)\operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{2\left(-3 i+\sqrt{3}\right)}\right)\sqrt{1+\frac{3 i\left(3 i-\sqrt{3}\right)\operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{\left(-3 i+\sqrt{3}\right)\left(3 i+\sqrt{3}\right)}}\right)\right)\right)\Big/$$

$$\left(\sqrt{3}\sqrt{\frac{\operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3-i\sqrt{3}}}\left(1+3\operatorname{Tan}\left[\frac{x}{2}\right]^4\right)\right) - \left(i \operatorname{Cos}[x]^2\left(\operatorname{EllipticF}\left[i \operatorname{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}\right], \frac{3 i-\sqrt{3}}{3 i+\sqrt{3}}\right] - \right.\right.$$

$$\left.\operatorname{EllipticPi}\left[\frac{1}{6}\left(3+i\sqrt{3}\right), i \operatorname{ArcSinh}\left[\sqrt{3}\sqrt{\frac{i \operatorname{Cos}[x]\operatorname{Sec}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}\right], \frac{3 i-\sqrt{3}}{3 i+\sqrt{3}}\right]\right)\operatorname{Sec}\left[\frac{x}{2}\right]^4\sqrt{\frac{\sqrt{3}-3 i \operatorname{Tan}\left[\frac{x}{2}\right]^2}{-3 i+\sqrt{3}}}$$

$$\left.\sqrt{\frac{\sqrt{3}+3 i \operatorname{Tan}\left[\frac{x}{2}\right]^2}{3 i+\sqrt{3}}}\left(\operatorname{Sec}[x]^3\left(-3\operatorname{Sin}[x]-3\operatorname{Sin}[3x]\right)+3\left(4+3\operatorname{Cos}[x]+\operatorname{Cos}[3x]\right)\operatorname{Sec}[x]^3\operatorname{Tan}[x]\right)\right)\Big/$$

$$\left(2\sqrt{3}\sqrt{\frac{\text{Cos}[x]\,\text{Sec}\left[\frac{x}{2}\right]^2}{-3-\text{i}\sqrt{3}}}\,\sqrt{\left(4+3\,\text{Cos}[x]+\text{Cos}[3\,x]\right)\text{Sec}[x]^3}\,\left(1+3\,\text{Tan}\left[\frac{x}{2}\right]^4\right)\right)\Bigg)\Bigg)\Bigg)$$

Problem 8: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int\sqrt{2+2\,\text{Tan}[x]+\text{Tan}[x]^2}\,dx$$

Optimal (type 3, 137 leaves, 9 steps):

$$\text{ArcSinh}[1+\text{Tan}[x]]-\sqrt{\frac{1}{2}\left(1+\sqrt{5}\right)}\,\text{ArcTan}\left[\frac{2\sqrt{5}-\left(5+\sqrt{5}\right)\text{Tan}[x]}{\sqrt{10\left(1+\sqrt{5}\right)}\sqrt{2+2\,\text{Tan}[x]+\text{Tan}[x]^2}}\right]-$$

$$\sqrt{\frac{1}{2}\left(-1+\sqrt{5}\right)}\,\text{ArcTanh}\left[\frac{2\sqrt{5}+\left(5-\sqrt{5}\right)\text{Tan}[x]}{\sqrt{10\left(-1+\sqrt{5}\right)}\sqrt{2+2\,\text{Tan}[x]+\text{Tan}[x]^2}}\right]$$

Result (type 4, 7376 leaves):

$$-\frac{1}{\left(1+\text{Cos}[x]\right)\sqrt{\frac{3+\text{Cos}[2\,x]+2\,\text{Sin}[2\,x]}{(1+\text{Cos}[x])^2}}}\,4\,\text{Cos}[x]$$

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

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

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

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

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

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

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

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

$$((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+\mathrm{Tan}[\tfrac{x}{2}])))]],$$

$$-(((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,3])\ (\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]-$$

$$\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4]))\,/\,((-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,3])$$

$$(\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4]))))]\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+$$

$$\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]))\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])$$

$$\surd(((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Tan}[\tfrac{x}{2}]))\,/$$

$$((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])$$

$$(-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+\mathrm{Tan}[\tfrac{x}{2}])))\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+\mathrm{Tan}[\tfrac{x}{2}])^{2}$$

$$\surd(((-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,3]+\mathrm{Tan}[\tfrac{x}{2}]))\,/$$

$$((-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,3])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+\mathrm{Tan}[\tfrac{x}{2}])))$$

$$\surd(((-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4]+\mathrm{Tan}[\tfrac{x}{2}]))\,/$$

$$((-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+\mathrm{Tan}[\tfrac{x}{2}]))))\,/$$

$$((-1+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1])\ (1-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2])$$

$$(-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2])$$

$$(\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])$$

$$\sqrt{1+2\,\mathrm{Tan}[\tfrac{x}{2}]-2\,\mathrm{Tan}[\tfrac{x}{2}]^{3}+\mathrm{Tan}[\tfrac{x}{2}]^{4}}\ )-$$

$$((2-i)\ (\mathrm{EllipticF}[\mathrm{ArcSin}[\surd(((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+$$

$$\mathrm{Tan}[\tfrac{x}{2}]))\,/\,((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+$$

$$\mathrm{Tan}[\tfrac{x}{2}])))],\ -(((\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,3])\ (\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]-$$

$$\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4]))\,/\,((-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,3])$$

$$(\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4]))))]\ (i-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1])-$$

$$\mathrm{EllipticPi}[((-i+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4]))\,/$$

$$((-i+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,1])\ (-\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,2]+\mathrm{Root}[1+2\#1-2\#1^{3}+\#1^{4}\&,4])),$$

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ArcSin[Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2]))/
   ((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]],
  -(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] -
       Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]))/((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3])
     (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])))] (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] +
  Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])
Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2]))/
  ((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])
   (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))] (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])^2
Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3] + Tan[x/2]))/
  ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]
Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4] + Tan[x/2]))/
  ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))])/
((-I + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) (I - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])
 (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])
 (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])
 Sqrt[1 + 2 Tan[x/2] - 2 Tan[x/2]^3 + Tan[x/2]^4]) -
((2 + I) (EllipticF[ArcSin[Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] +
          Tan[x/2]))/((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] +
          Tan[x/2])))]], -(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] -
         Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]))/((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3])
       (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])))] (-I - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) -
   EllipticPi[((I + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]))/
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((i + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])),

ArcSin[Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2])) /

((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]],

-(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] -

Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])) / ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3])

(Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])))] (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] +

Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])

Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2])) /

((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])

(-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))] (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])^2

Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3] + Tan[x/2])) /

((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]

Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4] + Tan[x/2])) /

((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]) /

((i + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) (-i - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])

(-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])

(Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])

Sqrt[1 + 2 Tan[x/2] - 2 Tan[x/2]^3 + Tan[x/2]^4]) -

((EllipticF[ArcSin[Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2])) /

((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]],

-(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] -

Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])) / ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3])

(Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])))] (-1 - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) -

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EllipticPi[((1 + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])) /
  ((1 + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])),
  ArcSin[Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2])) /
    ((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]],
  -(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] -
      Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])) / ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3])
    (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])))] (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] +
  Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])

Sqrt[(((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2])) /
  ((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])
    (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))] (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])^2

Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3] + Tan[x/2])) /
  ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]
Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4] + Tan[x/2])) /
  ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))] /
((1 + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1]) (-1 - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])
  (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2])
  (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])
  Sqrt[1 + 2 Tan[x/2] - 2 Tan[x/2]^3 + Tan[x/2]^4]) + (2 EllipticF[
  ArcSin[Sqrt[(((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Tan[x/2])) /
    ((-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] + Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4]) (-Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] + Tan[x/2])))]],
  ((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 2] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3]) (Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] -
      Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 4])) / ((Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 1] - Root[1 + 2 #1 - 2 #1^3 + #1^4 &, 3])
```

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

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

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

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

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

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

Problem 9: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \text{ArcTan}\left[\sqrt{-1+\text{Sec}[x]}\right]\text{Sin}[x]\,dx$$

Optimal (type 3, 41 leaves, 7 steps):

$$\frac{1}{2}\text{ArcTan}\left[\sqrt{-1+\text{Sec}[x]}\right]-\text{ArcTan}\left[\sqrt{-1+\text{Sec}[x]}\right]\text{Cos}[x]+\frac{1}{2}\text{Cos}[x]\sqrt{-1+\text{Sec}[x]}$$

Result (type 4, 285 leaves):

$$-\text{ArcTan}\left[\sqrt{-1+\text{Sec}[x]}\right]\text{Cos}[x]+\frac{1}{2}\text{Cos}[x]\sqrt{-1+\text{Sec}[x]}-\frac{1}{2}\left(-3-2\sqrt{2}\right)\text{Cos}\left[\frac{x}{4}\right]^2\left(1-\sqrt{2}+\left(-2+\sqrt{2}\right)\text{Cos}\left[\frac{x}{2}\right]\right)$$
$$\text{Cot}\left[\frac{x}{4}\right]\left(\text{EllipticF}\left[\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{x}{4}\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]+2\,\text{EllipticPi}\left[-3+2\sqrt{2},-\text{ArcSin}\left[\frac{\text{Tan}\left[\frac{x}{4}\right]}{\sqrt{3-2\sqrt{2}}}\right],17-12\sqrt{2}\right]\right)$$
$$\sqrt{\left(7-5\sqrt{2}+\left(10-7\sqrt{2}\right)\text{Cos}\left[\frac{x}{2}\right]\right)\text{Sec}\left[\frac{x}{4}\right]^2}\sqrt{\left(-1-\sqrt{2}+\left(2+\sqrt{2}\right)\text{Cos}\left[\frac{x}{2}\right]\right)\text{Sec}\left[\frac{x}{4}\right]^2}$$
$$\sqrt{-1+\text{Sec}[x]}\,\text{Sec}[x]\sqrt{3-2\sqrt{2}-\text{Tan}\left[\frac{x}{4}\right]^2}\sqrt{1+\left(-3+2\sqrt{2}\right)\text{Tan}\left[\frac{x}{4}\right]^2}$$

Problem 12: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \text{ArcTan}\left[x+\sqrt{1-x^2}\right]dx$$

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

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

Result (type 3, 1822 leaves):

$$x\,\text{ArcTan}\left[x+\sqrt{1-x^2}\right]+$$
$$\frac{1}{16}\left(-8\,\text{ArcSin}[x]+2\sqrt{2+2i\sqrt{3}}\,\text{ArcTan}\left[\left(\left(1+i\sqrt{3}-2x^2\right)\left(-1+x^2\right)\right)\Big/\left(-3i-\sqrt{3}+2\sqrt{3}\,x^4+x^3\left(-6-2i\sqrt{3}-2\sqrt{2-2i\sqrt{3}}\sqrt{1-x^2}\right)+\right.\right.\right.$$
$$\left.\left.x\left(6+2i\sqrt{3}-2\sqrt{2-2i\sqrt{3}}\sqrt{1-x^2}\right)+x^2\left(3i-\sqrt{3}+2\sqrt{6-6i\sqrt{3}}\sqrt{1-x^2}\right)\right)\right]-$$
$$2\sqrt{2+2i\sqrt{3}}\,\text{ArcTan}\left[\left(\left(1+i\sqrt{3}-2x^2\right)\left(-1+x^2\right)\right)\Big/\left(-3i-\sqrt{3}+2\sqrt{3}\,x^4+2x\left(-3-i\sqrt{3}+\sqrt{2-2i\sqrt{3}}\sqrt{1-x^2}\right)+\right.\right.$$
$$\left.\left.2x^3\left(3+i\sqrt{3}+\sqrt{2-2i\sqrt{3}}\sqrt{1-x^2}\right)+x^2\left(3i-\sqrt{3}+2\sqrt{6-6i\sqrt{3}}\sqrt{1-x^2}\right)\right)\right]-$$
$$2\sqrt{2-2i\sqrt{3}}\,\text{ArcTan}\left[\left(\left(-1+x^2\right)\left(-1+i\sqrt{3}+2x^2\right)\right)\Big/\left(3i-\sqrt{3}+2\sqrt{3}\,x^4+x\left(6-2i\sqrt{3}-2\sqrt{2+2i\sqrt{3}}\sqrt{1-x^2}\right)+\right.\right.$$
$$\left.\left.x^3\left(-6+2i\sqrt{3}-2\sqrt{2+2i\sqrt{3}}\sqrt{1-x^2}\right)+x^2\left(-3i-\sqrt{3}+2\sqrt{6+6i\sqrt{3}}\sqrt{1-x^2}\right)\right)\right]+$$
$$2\sqrt{2-2i\sqrt{3}}\,\text{ArcTan}\left[\left(\left(-1+x^2\right)\left(-1+i\sqrt{3}+2x^2\right)\right)\Big/\left(3i-\sqrt{3}+2\sqrt{3}\,x^4+2x^3\left(3-i\sqrt{3}+\sqrt{2+2i\sqrt{3}}\sqrt{1-x^2}\right)+\right.\right.$$

$$2\,x\left(-3+i\sqrt{3}+\sqrt{2+2\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+x^2\left(-3\,i-\sqrt{3}+2\sqrt{6+6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)\Big)\Big]-$$

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

$$i\sqrt{2-2\,i\sqrt{3}}\,\text{Log}\left[16\left(1+\sqrt{3}\,x+x^2\right)^2\right]+i\sqrt{2+2\,i\sqrt{3}}\,\text{Log}\left[16\left(1+\sqrt{3}\,x+x^2\right)^2\right]+$$

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

$$i\sqrt{2+2\,i\sqrt{3}}\,\text{Log}\Big[3\,i+\sqrt{3}-\left(-i+\sqrt{3}\right)x^4+2\,i\sqrt{2-2\,i\sqrt{3}}\,\sqrt{1-x^2}+5\,i\,x^2\left(2+\sqrt{2-2\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+$$

$$x\left(3+5\,i\sqrt{3}+3\,i\sqrt{6-6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+i\,x^3\left(3\,i+3\sqrt{3}+\sqrt{6-6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)\Big]+$$

$$i\sqrt{2+2\,i\sqrt{3}}\,\text{Log}\Big[3\,i+\sqrt{3}-\left(-i+\sqrt{3}\right)x^4+2\,i\sqrt{2-2\,i\sqrt{3}}\,\sqrt{1-x^2}+5\,i\,x^2\left(2+\sqrt{2-2\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+$$

$$x^3\left(3-3\,i\sqrt{3}-i\sqrt{6-6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)-i\,x\left(-3\,i+5\sqrt{3}+3\sqrt{6-6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)\Big]+$$

$$i\sqrt{2-2\,i\sqrt{3}}\,\text{Log}\Big[-3\,i+\sqrt{3}-\left(i+\sqrt{3}\right)x^4-2\,i\sqrt{2+2\,i\sqrt{3}}\,\sqrt{1-x^2}-5\,i\,x^2\left(2+\sqrt{2+2\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+$$

$$x\left(3-5\,i\sqrt{3}-3\,i\sqrt{6+6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)-i\,x^3\left(-3\,i+3\sqrt{3}+\sqrt{6+6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)\Big]-$$

$$i\sqrt{2-2\,i\sqrt{3}}\,\text{Log}\Big[-3\,i+\sqrt{3}-\left(i+\sqrt{3}\right)x^4-2\,i\sqrt{2+2\,i\sqrt{3}}\,\sqrt{1-x^2}-5\,i\,x^2\left(2+\sqrt{2+2\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+$$

$$x^3\left(3+3\,i\sqrt{3}+i\sqrt{6+6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)+i\,x\left(3\,i+5\sqrt{3}+3\sqrt{6+6\,i\sqrt{3}}\,\sqrt{1-x^2}\right)\Big]\Big)$$

Problem 13: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

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

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

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

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

Result (type 3, 2408 leaves) :

$$-\frac{\text{ArcSin}[x]}{2}-\sqrt{1-x^2}\ \text{ArcTan}\left[x+\sqrt{1-x^2}\right]+\frac{1}{4\sqrt{6\left(1-i\sqrt{3}\right)}}$$

$$\left(-3 i+\sqrt{3}\right)\text{ArcTan}\Big[\Big(3-i\sqrt{3}-12 i x+4\sqrt{3}\,x-12 i\sqrt{3}\,x^2-12 i x^3-4\sqrt{3}\,x^3-3x^4-$$

$$i\sqrt{3}\,x^4-2 i\sqrt{2\left(1-i\sqrt{3}\right)}\,x\sqrt{1-x^2}-2 i\sqrt{6\left(1-i\sqrt{3}\right)}\,x^2\sqrt{1-x^2}-2 i\sqrt{2\left(1-i\sqrt{3}\right)}\,x^3\sqrt{1-x^2}\Big)\Big/$$

$$\left(i-\sqrt{3}-6x+6 i\sqrt{3}\,x+30 i x^2-2\sqrt{3}\,x^2+6x^3+18 i\sqrt{3}\,x^3+11 i x^4+3\sqrt{3}\,x^4\right)\Big]-\frac{1}{4\sqrt{6\left(1-i\sqrt{3}\right)}}$$

$$\left(-3 i+\sqrt{3}\right)\text{ArcTan}\Big[\Big(3-i\sqrt{3}+12 i x-4\sqrt{3}\,x-12 i\sqrt{3}\,x^2+12 i x^3+4\sqrt{3}\,x^3-3x^4-i\sqrt{3}\,x^4+$$

$$2 i\sqrt{2\left(1-i\sqrt{3}\right)}\,x\sqrt{1-x^2}-2 i\sqrt{6\left(1-i\sqrt{3}\right)}\,x^2\sqrt{1-x^2}+2 i\sqrt{2\left(1-i\sqrt{3}\right)}\,x^3\sqrt{1-x^2}\Big)\Big/$$

$$\left(i-\sqrt{3}+6x-6 i\sqrt{3}\,x+30 i x^2-2\sqrt{3}\,x^2-6x^3-18 i\sqrt{3}\,x^3+11 i x^4+3\sqrt{3}\,x^4\right)\Big]-\frac{1}{4\sqrt{6\left(1+i\sqrt{3}\right)}}$$

$$\left(3 i+\sqrt{3}\right)\text{ArcTan}\Big[\Big(-3-i\sqrt{3}-12 i x-4\sqrt{3}\,x-12 i\sqrt{3}\,x^2-12 i x^3+4\sqrt{3}\,x^3+3x^4-i\sqrt{3}\,x^4-$$

$$2 i\sqrt{2\left(1+i\sqrt{3}\right)}\,x\sqrt{1-x^2}-2 i\sqrt{6\left(1+i\sqrt{3}\right)}\,x^2\sqrt{1-x^2}-2 i\sqrt{2\left(1+i\sqrt{3}\right)}\,x^3\sqrt{1-x^2}\Big)\Big/$$

$$\left(-i-\sqrt{3}-6x-6 i\sqrt{3}\,x-30 i x^2-2\sqrt{3}\,x^2+6x^3-18 i\sqrt{3}\,x^3-11 i x^4+3\sqrt{3}\,x^4\right)\Big]+\frac{1}{4\sqrt{6\left(1+i\sqrt{3}\right)}}$$

$$\left(3 i+\sqrt{3}\right)\text{ArcTan}\Big[\Big(-3-i\sqrt{3}+12 i x+4\sqrt{3}\,x-12 i\sqrt{3}\,x^2+12 i x^3-4\sqrt{3}\,x^3+3x^4-i\sqrt{3}\,x^4+$$

$$2 i\sqrt{2\left(1+i\sqrt{3}\right)}\,x\sqrt{1-x^2}-2 i\sqrt{6\left(1+i\sqrt{3}\right)}\,x^2\sqrt{1-x^2}+2 i\sqrt{2\left(1+i\sqrt{3}\right)}\,x^3\sqrt{1-x^2}\Big)\Big/$$

$$\left(-i-\sqrt{3}+6x+6 i\sqrt{3}\,x-30 i x^2-2\sqrt{3}\,x^2-6x^3+18 i\sqrt{3}\,x^3-11 i x^4+3\sqrt{3}\,x^4\right)\Big]-$$

$$\frac{i\left(-3\,i+\sqrt{3}\right)\,\text{Log}\left[\left(-i+\sqrt{3}-2\,x\right)^2\,\left(i+\sqrt{3}-2\,x\right)^2\right]}{8\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}}+\frac{i\left(3\,i+\sqrt{3}\right)\,\text{Log}\left[\left(-i+\sqrt{3}-2\,x\right)^2\,\left(i+\sqrt{3}-2\,x\right)^2\right]}{8\,\sqrt{6\,\left(1+i\,\sqrt{3}\right)}}+$$

$$\frac{i\left(-3\,i+\sqrt{3}\right)\,\text{Log}\left[\left(-i+\sqrt{3}+2\,x\right)^2\,\left(i+\sqrt{3}+2\,x\right)^2\right]}{8\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}}-$$

$$\frac{i\left(3\,i+\sqrt{3}\right)\,\text{Log}\left[\left(-i+\sqrt{3}+2\,x\right)^2\,\left(i+\sqrt{3}+2\,x\right)^2\right]}{8\,\sqrt{6\,\left(1+i\,\sqrt{3}\right)}}+$$

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

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

$$\frac{1}{8\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}}$$

$$i\left(-3\,i+\sqrt{3}\right)\,\text{Log}\Big[3\,i+\sqrt{3}-3\,x-5\,i\,\sqrt{3}\,x+10\,i\,x^2+3\,x^3-3\,i\,\sqrt{3}\,x^3+i\,x^4-\sqrt{3}\,x^4+2\,i\,\sqrt{2\,\left(1-i\,\sqrt{3}\right)}\,\sqrt{1-x^2}-$$
$$3\,i\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}\,x\,\sqrt{1-x^2}+5\,i\,\sqrt{2\,\left(1-i\,\sqrt{3}\right)}\,x^2\,\sqrt{1-x^2}-i\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}\,x^3\,\sqrt{1-x^2}\Big]-\frac{1}{8\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}}$$

$$i\left(-3\,i+\sqrt{3}\right)\,\text{Log}\Big[3\,i+\sqrt{3}+3\,x+5\,i\,\sqrt{3}\,x+10\,i\,x^2-3\,x^3+3\,i\,\sqrt{3}\,x^3+i\,x^4-\sqrt{3}\,x^4+2\,i\,\sqrt{2\,\left(1-i\,\sqrt{3}\right)}\,\sqrt{1-x^2}+$$
$$3\,i\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}\,x\,\sqrt{1-x^2}+5\,i\,\sqrt{2\,\left(1-i\,\sqrt{3}\right)}\,x^2\,\sqrt{1-x^2}+i\,\sqrt{6\,\left(1-i\,\sqrt{3}\right)}\,x^3\,\sqrt{1-x^2}\Big]+\frac{1}{8\,\sqrt{6\,\left(1+i\,\sqrt{3}\right)}}$$

$$i\left(3\,i+\sqrt{3}\right)\,\text{Log}\Big[-3\,i+\sqrt{3}+3\,x-5\,i\,\sqrt{3}\,x-10\,i\,x^2-3\,x^3-3\,i\,\sqrt{3}\,x^3-i\,x^4-\sqrt{3}\,x^4-2\,i\,\sqrt{2\,\left(1+i\,\sqrt{3}\right)}\,\sqrt{1-x^2}-$$

$$3\,i\,\sqrt{6\left(1+i\sqrt{3}\right)}\;x\sqrt{1-x^2}-5\,i\,\sqrt{2\left(1+i\sqrt{3}\right)}\;x^2\sqrt{1-x^2}-i\,\sqrt{6\left(1+i\sqrt{3}\right)}\;x^3\sqrt{1-x^2}\,\Big]-\frac{1}{8\sqrt{6\left(1+i\sqrt{3}\right)}}$$

$$i\left(3\,i+\sqrt{3}\right)\text{Log}\Big[-3\,i+\sqrt{3}-3\,x+5\,i\sqrt{3}\;x-10\,i\,x^2+3\,x^3+3\,i\sqrt{3}\;x^3-i\,x^4-\sqrt{3}\;x^4-2\,i\,\sqrt{2\left(1+i\sqrt{3}\right)}\;\sqrt{1-x^2}+$$

$$3\,i\,\sqrt{6\left(1+i\sqrt{3}\right)}\;x\sqrt{1-x^2}-5\,i\,\sqrt{2\left(1+i\sqrt{3}\right)}\;x^2\sqrt{1-x^2}+i\,\sqrt{6\left(1+i\sqrt{3}\right)}\;x^3\sqrt{1-x^2}\,\Big]$$

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

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

Optimal (type 3, 32 leaves, 3 steps):

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

Result (type 3, 89 leaves):

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

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

$$\int\frac{x^3\,\text{ArcSin}[x]}{\sqrt{1-x^4}}\,dx$$

Optimal (type 3, 38 leaves, 5 steps):

$$\frac{1}{4}\,x\sqrt{1+x^2}-\frac{1}{2}\sqrt{1-x^4}\;\text{ArcSin}[x]+\frac{\text{ArcSinh}[x]}{4}$$

Result (type 3, 85 leaves):

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

Problem 37: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

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

Optimal (type 3, 16 leaves, 2 steps):

$$-\frac{\text{ArcTanh}\left[\frac{\text{Cos}[x]}{\sqrt{2}}\right]}{\sqrt{2}}$$

Result (type 3, 46 leaves):

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

Problem 38: Result unnecessarily involves higher level functions.

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

Optimal (type 3, 23 leaves, 2 steps):

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

Result (type 4, 36 leaves):

$$(-1)^{1/4}\left(\text{EllipticF}\left[i\,\text{ArcSinh}\left[(-1)^{1/4}x\right],-1\right]-2\,\text{EllipticPi}\left[i,\text{ArcSin}\left[(-1)^{3/4}x\right],-1\right]\right)$$

Problem 39: Result unnecessarily involves higher level functions.

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

Optimal (type 3, 23 leaves, 2 steps):

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

Result (type 4, 40 leaves):

$$(-1)^{1/4}\left(\text{EllipticF}\left[i\,\text{ArcSinh}\left[(-1)^{1/4}x\right],-1\right]-2\,\text{EllipticPi}\left[-i,\,i\,\text{ArcSinh}\left[(-1)^{1/4}x\right],-1\right]\right)$$

Problem 41: Result more than twice size of optimal antiderivative.

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

Optimal (type 3, 42 leaves, 6 steps):

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

Result (type 3, 87 leaves):

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

Problem 44: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.

$$\int \frac{\text{Sin}[x]}{\sqrt{1-\text{Sin}[x]^6}}\,dx$$

Optimal (type 3, 39 leaves, 4 steps):

$$\frac{\text{ArcTanh}\left[\frac{\sqrt{3}\,\text{Cos}[x]\,(1+\text{Sin}[x]^2)}{2\sqrt{1-\text{Sin}[x]^6}}\right]}{2\sqrt{3}}$$

Result (type 4, 5825 leaves):

$$-\left(\left((-1)^{3/4}\left(3\,i+(1+2\,i)\sqrt{2}\,3^{1/4}+(1+2\,i)\sqrt{3}+i\sqrt{2}\,3^{3/4}\right)\right.\right.$$

$$\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\right],8-4\sqrt{3}\right]-2\times 3^{1/4}\left(\sqrt{2}+3^{1/4}\right)\text{EllipticPi}\left[\right.$$

$$\frac{6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\sqrt{3}}{3+3\sqrt{2}\,3^{1/4}+(2-i)\sqrt{3}+\sqrt{2}\,3^{3/4}},\ \text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\Big],\ 8-4\sqrt{3}\Big]\Bigg)$$

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

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

$$\Bigg(\sqrt{2}\,3^{1/4}\left(\left(3+6\,i\right)\sqrt{2}+\left(6+6\,i\right)3^{1/4}+\left(2+2\,i\right)3^{3/4}+\left(3+2\,i\right)\sqrt{6}\right)\sqrt{1-\text{Sin}[x]^6}\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2$$

$$\sqrt{\frac{1+8\,\text{Tan}\left[\frac{x}{2}\right]^2+30\,\text{Tan}\left[\frac{x}{2}\right]^4+8\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\Bigg(-\Bigg(\Bigg(\Bigg((-1)^{3/4}\sqrt{2}\Bigg(\left(3\,i+\left(1+2\,i\right)\sqrt{2}\,3^{1/4}+\left(1+2\,i\right)\sqrt{3}+i\sqrt{2}\,3^{3/4}\right)\text{EllipticF}\Big[$$

$$\text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\Big],\ 8-4\sqrt{3}\Big]-2\times 3^{1/4}\left(\sqrt{2}+3^{1/4}\right)\text{EllipticPi}\Big[$$

$$\frac{6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\sqrt{3}}{3+3\sqrt{2}\,3^{1/4}+(2-i)\sqrt{3}+\sqrt{2}\,3^{3/4}},\ \text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\Big],\ 8-4\sqrt{3}\Big]\Bigg)$$

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

$$\sqrt{-\frac{\left(i\sqrt{2}+3^{1/4}\right)\left(-i+2\left(-2\,i+\sqrt{3}\right)\text{Tan}\left[\frac{x}{2}\right]^2-i\,\text{Tan}\left[\frac{x}{2}\right]^4\right)}{\left(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}}\Bigg)\Big/\Bigg(3^{1/4}\left(\left(3+6\,i\right)\sqrt{2}+\left(6+6\,i\right)3^{1/4}+\left(2+2\,i\right)3^{3/4}+\left(3+2\,i\right)\sqrt{6}\right)$$

$$\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2 \sqrt{\frac{1+8\,\text{Tan}\left[\frac{x}{2}\right]^2+30\,\text{Tan}\left[\frac{x}{2}\right]^4+8\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\,\Bigg)\Bigg)+$$

$$\Bigg((-1)^{3/4}\sqrt{2}\,\Bigg(\left(3\,i+(1+2\,i)\sqrt{2}\,3^{1/4}+(1+2\,i)\sqrt{3}+i\sqrt{2}\,3^{3/4}\right)\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{1}{2}$$

$$\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\,\Big],8-4\sqrt{3}\Big]-2\times 3^{1/4}\left(\sqrt{2}+3^{1/4}\right)\text{EllipticPi}\Big[$$

$$\frac{6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\sqrt{3}}{3+3\sqrt{2}\,3^{1/4}+(2-i)\sqrt{3}+\sqrt{2}\,3^{3/4}},\text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\,\Big],8-4\sqrt{3}\Big]\Bigg)$$

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

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

$$\Bigg(3^{1/4}\left((3+6\,i)\sqrt{2}+(6+6\,i)\,3^{1/4}+(2+2\,i)\,3^{3/4}+(3+2\,i)\sqrt{6}\right)\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^3\sqrt{\frac{1+8\,\text{Tan}\left[\frac{x}{2}\right]^2+30\,\text{Tan}\left[\frac{x}{2}\right]^4+8\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\,\Bigg)-$$

$$\Bigg((-1)^{3/4}\Bigg(\left(3\,i+(1+2\,i)\sqrt{2}\,3^{1/4}+(1+2\,i)\sqrt{3}+i\sqrt{2}\,3^{3/4}\right)$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\,\Big],8-4\sqrt{3}\Big]-2\times 3^{1/4}\left(\sqrt{2}+3^{1/4}\right)\text{EllipticPi}\Big[$$

$$\frac{6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\,\sqrt{3}}{3+3\,\sqrt{2}\,3^{1/4}+(2-i)\,\sqrt{3}+\sqrt{2}\,3^{3/4}},\ \text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\,\Big(\big(2+\sqrt{2}\,3^{1/4}\big)\,\big(2+\sqrt{3}\big)+\big(2-i\,\sqrt{2}\,3^{1/4}\big)\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2}}\Big],\ 8-4\,\sqrt{3}\Big]\Bigg)$$

$$\Big(2-2\,(-1)^{3/4}\,3^{1/4}-i\,\sqrt{3}+\text{Tan}\Big[\frac{x}{2}\Big]^2\Big)^2\,\sqrt{-\frac{\big(i\,\sqrt{2}+3^{1/4}\big)\,\Big(-i+2\,\big(-2\,i+\sqrt{3}\big)\,\text{Tan}\big[\frac{x}{2}\big]^2-i\,\text{Tan}\big[\frac{x}{2}\big]^4\Big)}{\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)^2}}$$

$$\Bigg(-\frac{i\,\text{Sec}\big[\frac{x}{2}\big]^2\,\text{Tan}\big[\frac{x}{2}\big]\,\Big(2\,i-2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}{\big(-i\,\sqrt{2}+3^{1/4}\big)\,\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)^2}+\frac{i\,\text{Sec}\big[\frac{x}{2}\big]^2\,\text{Tan}\big[\frac{x}{2}\big]}{\big(-i\,\sqrt{2}+3^{1/4}\big)\,\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}\Bigg)\Bigg)\Bigg/$$

$$\Bigg(2\,\sqrt{2}\,3^{1/4}\,\Big((3+6\,i)\,\sqrt{2}+(6+6\,i)\,3^{1/4}+(2+2\,i)\,3^{3/4}+(3+2\,i)\,\sqrt{6}\Big)\,\sqrt{\frac{2\,i-2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2}{\big(-i\,\sqrt{2}+3^{1/4}\big)\,\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}}$$

$$\Big(1+\text{Tan}\Big[\frac{x}{2}\Big]^2\Big)^2\,\sqrt{\frac{1+8\,\text{Tan}\big[\frac{x}{2}\big]^2+30\,\text{Tan}\big[\frac{x}{2}\big]^4+8\,\text{Tan}\big[\frac{x}{2}\big]^6+\text{Tan}\big[\frac{x}{2}\big]^8}{\Big(1+\text{Tan}\big[\frac{x}{2}\big]^2\Big)^4}}\Bigg)-\Bigg((-1)^{3/4}\,\Bigg(\Big(3\,i+(1+2\,i)\,\sqrt{2}\,3^{1/4}+(1+2\,i)\,\sqrt{3}+i\,\sqrt{2}\,3^{3/4}\Big)$$

$$\text{EllipticF}\Big[\text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\,\Big(\big(2+\sqrt{2}\,3^{1/4}\big)\,\big(2+\sqrt{3}\big)+\big(2-i\,\sqrt{2}\,3^{1/4}\big)\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2}}\Big],\ 8-4\,\sqrt{3}\Big]-2\times 3^{1/4}\,\big(\sqrt{2}+3^{1/4}\big)\,\text{EllipticPi}\Big[$$

$$\frac{6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\,\sqrt{3}}{3+3\,\sqrt{2}\,3^{1/4}+(2-i)\,\sqrt{3}+\sqrt{2}\,3^{3/4}},\ \text{ArcSin}\Big[\frac{1}{2}\sqrt{\frac{(1+i)\,\Big(\big(2+\sqrt{2}\,3^{1/4}\big)\,\big(2+\sqrt{3}\big)+\big(2-i\,\sqrt{2}\,3^{1/4}\big)\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2}}\Big],\ 8-4\,\sqrt{3}\Big]\Bigg)$$

$$\sqrt{\frac{2\,i-2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2}{\big(-i\,\sqrt{2}+3^{1/4}\big)\,\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)}}\ \Big(2-2\,(-1)^{3/4}\,3^{1/4}-i\,\sqrt{3}+\text{Tan}\Big[\frac{x}{2}\Big]^2\Big)^2$$

$$\Bigg(-\frac{\big(i\,\sqrt{2}+3^{1/4}\big)\,\Big(2\,\big(-2\,i+\sqrt{3}\big)\,\text{Sec}\big[\frac{x}{2}\big]^2\,\text{Tan}\big[\frac{x}{2}\big]-2\,i\,\text{Sec}\big[\frac{x}{2}\big]^2\,\text{Tan}\big[\frac{x}{2}\big]^3\Big)}{\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)^2}+$$

$$\frac{2\,i\,\big(i\,\sqrt{2}+3^{1/4}\big)\,\text{Sec}\big[\frac{x}{2}\big]^2\,\text{Tan}\big[\frac{x}{2}\big]\,\Big(-i+2\,\big(-2\,i+\sqrt{3}\big)\,\text{Tan}\big[\frac{x}{2}\big]^2-i\,\text{Tan}\big[\frac{x}{2}\big]^4\Big)}{\Big(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\big[\frac{x}{2}\big]^2\Big)^3}\Bigg)\Bigg)\Bigg/$$

$$\left(2\sqrt{2}\,3^{1/4}\left((3+6\,i)\sqrt{2}+(6+6\,i)\,3^{1/4}+(2+2\,i)\,3^{3/4}+(3+2\,i)\sqrt{6}\right)\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2\right.$$

$$\left.\sqrt{-\frac{\left(i\sqrt{2}+3^{1/4}\right)\left(-i+2\left(-2\,i+\sqrt{3}\right)\text{Tan}\left[\frac{x}{2}\right]^2-i\,\text{Tan}\left[\frac{x}{2}\right]^4\right)}{\left(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2\right)^2}}\sqrt{\frac{1+8\,\text{Tan}\left[\frac{x}{2}\right]^2+30\,\text{Tan}\left[\frac{x}{2}\right]^4+8\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\right)+$$

$$\left((-1)^{3/4}\left(\left(3\,i+(1+2\,i)\sqrt{2}\,3^{1/4}+(1+2\,i)\sqrt{3}+i\sqrt{2}\,3^{3/4}\right)\text{EllipticF}\left[\text{ArcSin}\left[\frac{1}{2}\right.\right.\right.\right.$$

$$\left.\left.\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\right],8-4\sqrt{3}\right]-2\times 3^{1/4}\left(\sqrt{2}+3^{1/4}\right)\text{EllipticPi}\Big[$$

$$\left.\frac{6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\sqrt{3}}{3+3\sqrt{2}\,3^{1/4}+(2-i)\sqrt{3}+\sqrt{2}\,3^{3/4}},\text{ArcSin}\left[\frac{1}{2}\sqrt{\frac{(1+i)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\text{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\text{Tan}\left[\frac{x}{2}\right]^2}}\right],8-4\sqrt{3}\right]\right)$$

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

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

$$\left(\frac{8\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]+60\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^3+24\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^5+4\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]^7}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}-\right.$$

$$\left.\left.\frac{4\,\text{Sec}\left[\frac{x}{2}\right]^2\text{Tan}\left[\frac{x}{2}\right]\left(1+8\,\text{Tan}\left[\frac{x}{2}\right]^2+30\,\text{Tan}\left[\frac{x}{2}\right]^4+8\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8\right)}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^5}\right)\right)\Big/\left(2\sqrt{2}\,3^{1/4}\right.$$

$$\left(\left((3+6\,i)\sqrt{2}+(6+6\,i)\,3^{1/4}+(2+2\,i)\,3^{3/4}+(3+2\,i)\sqrt{6}\right)\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^2\left(\frac{1+8\,\text{Tan}\left[\frac{x}{2}\right]^2+30\,\text{Tan}\left[\frac{x}{2}\right]^4+8\,\text{Tan}\left[\frac{x}{2}\right]^6+\text{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\text{Tan}\left[\frac{x}{2}\right]^2\right)^4}\right)^{3/2}\right)-$$

$$\left((-1)^{3/4}\sqrt{\frac{2\,\mathrm{i}-2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}{\left(-\mathrm{i}\,\sqrt{2}+3^{1/4}\right)\left(2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}}\;\left(2-2\,(-1)^{3/4}\,3^{1/4}-\mathrm{i}\,\sqrt{3}+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2\right.$$

$$\sqrt{-\frac{\left(\mathrm{i}\,\sqrt{2}+3^{1/4}\right)\left(-\mathrm{i}+2\left(-2\,\mathrm{i}+\sqrt{3}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2-\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^4\right)}{\left(2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2}}\;\left(\left(\left(3\,\mathrm{i}+(1+2\,\mathrm{i})\,\sqrt{2}\,3^{1/4}+(1+2\,\mathrm{i})\,\sqrt{3}+\mathrm{i}\,\sqrt{2}\,3^{3/4}\right)\right.\right.$$

$$\left.\left.\left(\frac{(1+\mathrm{i})\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}+\frac{(1-\mathrm{i})\,\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2}\right)\right)\right)\Big/$$

$$\left(4\sqrt{\frac{(1+\mathrm{i})\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}}\right.$$

$$\sqrt{1-\frac{\left(\frac{1}{4}+\frac{\mathrm{i}}{4}\right)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}}$$

$$\left.\sqrt{1-\frac{\left(\frac{1}{4}+\frac{\mathrm{i}}{4}\right)\left(8-4\,\sqrt{3}\right)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}}\right)-\left(3^{1/4}\left(\sqrt{2}+3^{1/4}\right)\right.$$

$$\left.\left(\frac{(1+\mathrm{i})\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}+\frac{(1-\mathrm{i})\,\mathrm{Sec}\left[\frac{x}{2}\right]^2\mathrm{Tan}\left[\frac{x}{2}\right]\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{\left(2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2}\right)\right)\Big/$$

$$\left(2\sqrt{\frac{(1+\mathrm{i})\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}}\right.$$

$$\sqrt{1-\frac{\left(\frac{1}{4}+\frac{\mathrm{i}}{4}\right)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}}$$

$$\sqrt{1-\frac{\left(\frac{1}{4}+\frac{\mathrm{i}}{4}\right)\left(8-4\,\sqrt{3}\right)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-\mathrm{i}\,\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)}{2\,\mathrm{i}+2\,(-3)^{1/4}+\sqrt{3}+\mathrm{i}\,\mathrm{Tan}\left[\frac{x}{2}\right]^2}}$$

$$\left(1-\left(\left(\frac{1}{4}+\frac{i}{4}\right)\left(6\,(-3)^{1/4}-2\,(-3)^{3/4}+4\sqrt{3}\right)\left(\left(2+\sqrt{2}\,3^{1/4}\right)\left(2+\sqrt{3}\right)+\left(2-i\sqrt{2}\,3^{1/4}\right)\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)\Big/\right.\right.$$
$$\left.\left.\left(\left(3+3\sqrt{2}\,3^{1/4}+(2-i)\sqrt{3}+\sqrt{2}\,3^{3/4}\right)\left(2\,i+2\,(-3)^{1/4}+\sqrt{3}+i\,\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)\right)\right)\right)\Big/\left(\sqrt{2}\,3^{1/4}\right.$$
$$\left.\left(\left(3+6\,i\right)\sqrt{2}+\left(6+6\,i\right)3^{1/4}+\left(2+2\,i\right)3^{3/4}+\left(3+2\,i\right)\sqrt{6}\right)\left(1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^2\sqrt{\frac{1+8\,\mathrm{Tan}\left[\frac{x}{2}\right]^2+30\,\mathrm{Tan}\left[\frac{x}{2}\right]^4+8\,\mathrm{Tan}\left[\frac{x}{2}\right]^6+\mathrm{Tan}\left[\frac{x}{2}\right]^8}{\left(1+\mathrm{Tan}\left[\frac{x}{2}\right]^2\right)^4}}\right)$$

Problem 47: Result unnecessarily involves imaginary or complex numbers.

$$\int \mathrm{ArcTan}\left[x\sqrt{1+x^2}\right]dx$$

Optimal (type 3, 120 leaves, 12 steps):

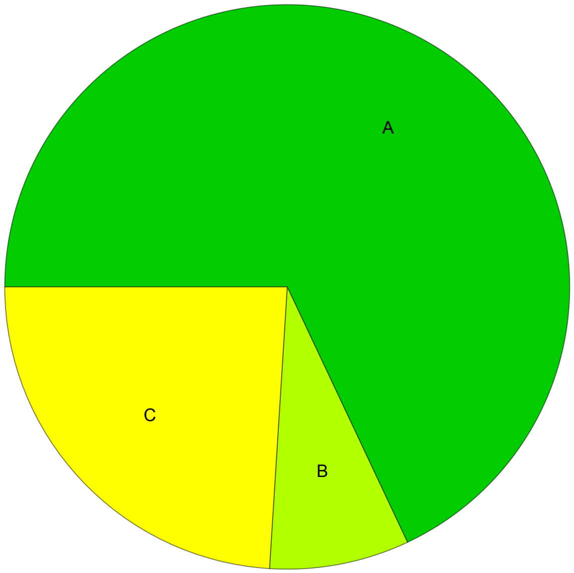
$$x\,\mathrm{ArcTan}\left[x\sqrt{1+x^2}\right]+\frac{1}{2}\mathrm{ArcTan}\left[\sqrt{3}-2\sqrt{1+x^2}\right]-\frac{1}{2}\mathrm{ArcTan}\left[\sqrt{3}+2\sqrt{1+x^2}\right]-\frac{1}{4}\sqrt{3}\,\mathrm{Log}\left[2+x^2-\sqrt{3}\sqrt{1+x^2}\right]+\frac{1}{4}\sqrt{3}\,\mathrm{Log}\left[2+x^2+\sqrt{3}\sqrt{1+x^2}\right]$$

Result (type 3, 116 leaves):

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

Summary of Integration Test Results

50 integration problems



A - 34 optimal antiderivatives

B - 4 more than twice size of optimal antiderivatives

C - 12 unnecessarily complex antiderivatives

D - 0 unable to integrate problems

E - 0 integration timeouts