Mathematica 11.3 Integration Test Results

Test results for the 83 problems in "4.5.11 (e x)^m (a+b sec(c+d x^n))^p.m"

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

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

Optimal (type 3, 26 leaves, 4 steps):

$$\frac{a x^2}{2} + \frac{b \operatorname{ArcTanh}\left[\operatorname{Sin}\left[c + d x^2\right]\right]}{2 d}$$

Result (type 3, 91 leaves):

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

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

$$\int x^3 \left(a + b \operatorname{Sec}\left[c + d x^2\right]\right)^2 \, dx$$

Optimal (type 4, 133 leaves, 10 steps):

$$\frac{a^2 x^4}{4} - \frac{2 i a b x^2 \operatorname{ArcTan}\left[e^{i \left(c+d x^2\right)}\right]}{d} + \frac{b^2 \operatorname{Log}\left[\operatorname{Cos}\left[c + d x^2\right]\right]}{2 d^2} + \frac{i a b \operatorname{PolyLog}\left[2, -i e^{i \left(c+d x^2\right)}\right]}{d^2} - \frac{i a b \operatorname{PolyLog}\left[2, i e^{i \left(c+d x^2\right)}\right]}{d^2} + \frac{b^2 x^2 \operatorname{Tan}\left[c + d x^2\right]}{2 d}$$

Result (type 4, 677 leaves):

$$\frac{x^2 \operatorname{Cos}\left[c+d x^2\right]^2 \left(a+b \operatorname{Sec}\left[c+d x^2\right]\right)^2 \left(a^2 d x^2 \operatorname{Cos}[c]+2 b^2 \operatorname{Sin}[c]\right)}{4 d \left(b+a \operatorname{Cos}\left[c+d x^2\right]\right)^2 \left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right) \left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)}+$$

$$\left(b^2 \operatorname{Cos}\left[c+d x^2\right]^2 \operatorname{Sec}[c] \left(a+b \operatorname{Sec}\left[c+d x^2\right]\right)^2 \left(\operatorname{Cos}[c] \operatorname{Log}\left[\operatorname{Cos}[c] \operatorname{Cos}\left[d x^2\right]-\operatorname{Sin}[c] \operatorname{Sin}\left[d x^2\right]\right]+d x^2 \operatorname{Sin}[c]\right)\right) \Big/ \left(2 d^2 \left(b+a \operatorname{Cos}\left[c+d x^2\right]\right)^2 \left(\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2\right)\right)+\frac{1}{d^2 \left(b+a \operatorname{Cos}\left[c+d x^2\right]\right)^2}$$

$$a b \operatorname{Cos}\left[c+d x^2\right]^2 \left(a+b \operatorname{Sec}\left[c+d x^2\right]\right)^2 \left(-\frac{1}{\sqrt{1+\operatorname{Cot}[c]^2}} \operatorname{Csc}[c] \left(\left(d x^2-\operatorname{ArcTan}[\operatorname{Cot}[c]]\right) \left(\operatorname{Log}\left[1-e^{i \left(d x^2-\operatorname{ArcTan}[\operatorname{Cot}[c]]\right)}\right]-\operatorname{Log}\left[1+e^{i \left(d x^2-\operatorname{ArcTan}[\operatorname{Cot}[c]]\right)}\right]\right)+ i \left(\operatorname{PolyLog}\left[2,-e^{i \left(d x^2-\operatorname{ArcTan}[\operatorname{Cot}[c]]\right)}\right]-\operatorname{PolyLog}\left[2, e^{i \left(d x^2-\operatorname{ArcTan}[\operatorname{Cot}[c]]\right)}\right]\right)\right)+\frac{2 \operatorname{ArcTan}[\operatorname{Cot}[c]] \operatorname{ArcTanh}\left[\frac{\operatorname{Sin}[c]+\operatorname{Cos}[c] \operatorname{Tan}\left[\frac{d x^2}{2}\right]}{\sqrt{\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2}}\right]}{\sqrt{\operatorname{Cos}[c]^2+\operatorname{Sin}[c]^2}}\right)+$$

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

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

$$\frac{b^2 x^2 \operatorname{Cos}\left[c+d x^2\right]^2 \left(a+b \operatorname{Sec}\left[c+d x^2\right]\right)^2 \operatorname{Tan}[c]}{2 d \left(b+a \operatorname{Cos}\left[c+d x^2\right]\right)^2}$$

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

$$\int x \left(a+b \operatorname{Sec}\left[c+d x^2\right]\right)^2 dx$$

Optimal (type 3, 44 leaves, 5 steps):

$$\frac{a^2 x^2}{2}+\frac{a b \operatorname{ArcTanh}\left[\operatorname{Sin}\left[c+d x^2\right]\right]}{d}+\frac{b^2 \operatorname{Tan}\left[c+d x^2\right]}{2 d}$$

Result (type 3, 92 leaves):

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

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

$$\int \frac{x^3}{a + b \operatorname{Sec}\left[c + d x^2\right]} \, dx$$

Optimal (type 4, 261 leaves, 11 steps):

$$\frac{x^4}{4 a} + \frac{i b x^2 \operatorname{Log}\left[1 + \frac{a e^{i (c+d x^2)}}{b-\sqrt{-a^2+b^2}}\right]}{2 a \sqrt{-a^2 + b^2} \, d} - \frac{i b x^2 \operatorname{Log}\left[1 + \frac{a e^{i (c+d x^2)}}{b+\sqrt{-a^2+b^2}}\right]}{2 a \sqrt{-a^2 + b^2} \, d} + \frac{b \operatorname{PolyLog}\left[2, -\frac{a e^{i (c+d x^2)}}{b-\sqrt{-a^2+b^2}}\right]}{2 a \sqrt{-a^2 + b^2} \, d^2} - \frac{b \operatorname{PolyLog}\left[2, -\frac{a e^{i (c+d x^2)}}{b+\sqrt{-a^2+b^2}}\right]}{2 a \sqrt{-a^2 + b^2} \, d^2}$$

Result (type 4, 845 leaves):

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

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

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

$$\left.2\,i\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^2\right)\right]}{\sqrt{a^2-b^2}}\right]\right)\text{Log}\left[\frac{\sqrt{a^2-b^2}\;e^{-\frac{1}{2}i\left(c+d\,x^2\right)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}\left[c+d\,x^2\right]}}\right]+$$

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

$$\left.\left.\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^2\right)\right]}{\sqrt{a^2-b^2}}\right]\right)\right)\text{Log}\left[\frac{\sqrt{a^2-b^2}\;e^{\frac{1}{2}i\left(c+d\,x^2\right)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}\left[c+d\,x^2\right]}}\right]-$$

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

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

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

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

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

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

Problem 53: Result more than twice size of optimal antiderivative.

$$\int\frac{a+b\,\text{Sec}\left[c+d\,\sqrt{x}\right]}{\sqrt{x}}\,dx$$

Optimal (type 3, 26 leaves, 4 steps):

$$2 a \sqrt{x}+\frac{2 b \text{ArcTanh}\left[\text{Sin}\left[c+d \sqrt{x}\right]\right]}{d}$$

Result (type 3, 84 leaves):

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

Problem 58: Result more than twice size of optimal antiderivative.

$$\int \frac{\left(a+b \text{Sec}\left[c+d \sqrt{x}\right]\right)^2}{\sqrt{x}} \, dx$$

Optimal (type 3, 47 leaves, 5 steps):

$$2 a^2 \sqrt{x}+\frac{4 a b \text{ArcTanh}\left[\text{Sin}\left[c+d \sqrt{x}\right]\right]}{d}+\frac{2 b^2 \text{Tan}\left[c+d \sqrt{x}\right]}{d}$$

Result (type 3, 102 leaves):

$$\frac{1}{d}2 \left(a \left(a c+a d \sqrt{x}-2 b \text{Log}\left[\text{Cos}\left[\frac{1}{2} \left(c+d \sqrt{x}\right)\right]-\text{Sin}\left[\frac{1}{2} \left(c+d \sqrt{x}\right)\right]\right]+ 2 b \text{Log}\left[\text{Cos}\left[\frac{1}{2} \left(c+d \sqrt{x}\right)\right]+\text{Sin}\left[\frac{1}{2} \left(c+d \sqrt{x}\right)\right]\right]\right)+b^2 \text{Tan}\left[c+d \sqrt{x}\right]\right)$$

Problem 72: Result more than twice size of optimal antiderivative.

$$\int (e x)^{-1+n} \left(a+b \text{Sec}\left[c+d x^n\right]\right) \, dx$$

Optimal (type 3, 44 leaves, 5 steps):

$$\frac{a (e x)^n}{e n}+\frac{b x^{-n} (e x)^n \text{ArcTanh}\left[\text{Sin}\left[c+d x^n\right]\right]}{d e n}$$

Result (type 3, 89 leaves):

$$\frac{1}{d e n}x^{-n} (e x)^n \left(a \left(c+d x^n\right)- b \text{Log}\left[\text{Cos}\left[\frac{1}{2} \left(c+d x^n\right)\right]-\text{Sin}\left[\frac{1}{2} \left(c+d x^n\right)\right]\right]+b \text{Log}\left[\text{Cos}\left[\frac{1}{2} \left(c+d x^n\right)\right]+\text{Sin}\left[\frac{1}{2} \left(c+d x^n\right)\right]\right]\right)$$

Problem 74: Unable to integrate problem.

$$\int (e x)^{-1+3 n} \left(a+b \text{Sec}\left[c+d x^n\right]\right) \, dx$$

Optimal (type 4, 235 leaves, 11 steps):

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

Result (type 8, 24 leaves):

$$\int (e\,x)^{-1+3\,n}\,\left(a+b\,\text{Sec}\left[c+d\,x^n\right]\right)\,dx$$

Problem 76: Result more than twice size of optimal antiderivative.

$$\int (e\,x)^{-1+2\,n}\,\left(a+b\,\text{Sec}\left[c+d\,x^n\right]\right)^2\,dx$$

Optimal (type 4, 221 leaves, 11 steps):

$$\frac{a^2\,(e\,x)^{2\,n}}{2\,e\,n}-\frac{4\,i\,a\,b\,x^{-n}\,(e\,x)^{2\,n}\,\text{ArcTan}\left[e^{i\,(c+d\,x^n)}\right]}{d\,e\,n}+\frac{b^2\,x^{-2\,n}\,(e\,x)^{2\,n}\,\text{Log}\left[\text{Cos}\left[c+d\,x^n\right]\right]}{d^2\,e\,n}+\frac{2\,i\,a\,b\,x^{-2\,n}\,(e\,x)^{2\,n}\,\text{PolyLog}\left[2,\,-i\,e^{i\,(c+d\,x^n)}\right]}{d^2\,e\,n}-\frac{2\,i\,a\,b\,x^{-2\,n}\,(e\,x)^{2\,n}\,\text{PolyLog}\left[2,\,i\,e^{i\,(c+d\,x^n)}\right]}{d^2\,e\,n}+\frac{b^2\,x^{-n}\,(e\,x)^{2\,n}\,\text{Tan}\left[c+d\,x^n\right]}{d\,e\,n}$$

Result (type 4, 769 leaves):

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

Problem 77: Unable to integrate problem.

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

Optimal (type 4, 390 leaves, 16 steps):

$$\frac{a^2 (e x)^{3n}}{3 e n} - \frac{i b^2 x^{-n} (e x)^{3n}}{d e n} - \frac{4 i a b x^{-n} (e x)^{3n} \text{ArcTan}\left[e^{i (c+d x^n)}\right]}{d e n} + \frac{2 b^2 x^{-2n} (e x)^{3n} \text{Log}\left[1 + e^{2 i (c+d x^n)}\right]}{d^2 e n} + \frac{4 i a b x^{-2n} (e x)^{3n} \text{PolyLog}\left[2, -i e^{i (c+d x^n)}\right]}{d^2 e n} - \frac{4 i a b x^{-2n} (e x)^{3n} \text{PolyLog}\left[2, i e^{i (c+d x^n)}\right]}{d^2 e n} - \frac{i b^2 x^{-3n} (e x)^{3n} \text{PolyLog}\left[2, -e^{2 i (c+d x^n)}\right]}{d^3 e n} - \frac{4 a b x^{-3n} (e x)^{3n} \text{PolyLog}\left[3, -i e^{i (c+d x^n)}\right]}{d^3 e n} + \frac{4 a b x^{-3n} (e x)^{3n} \text{PolyLog}\left[3, i e^{i (c+d x^n)}\right]}{d^3 e n} + \frac{b^2 x^{-n} (e x)^{3n} \text{Tan}[c + d x^n]}{d e n}$$

Result (type 8, 26 leaves):

$$\int (e x)^{-1+3n} \left(a + b \text{Sec}[c + d x^n]\right)^2 dx$$

Problem 79: Result more than twice size of optimal antiderivative.

$$\int \frac{(e x)^{-1+2n}}{a + b \text{Sec}[c + d x^n]} dx$$

Optimal (type 4, 328 leaves, 12 steps):

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

Result (type 4, 861 leaves):

$$\frac{1}{2\,a\,e\,n\,\left(a+b\,\text{Sec}[c+d\,x^n]\right)}\,(e\,x)^{2\,n}\,\left(b+a\,\text{Cos}[c+d\,x^n]\right)$$

$$\Bigg(1-\frac{1}{\sqrt{a^2-b^2}\,d^2}\,2\,b\,x^{-2\,n}\,\Bigg(2\,(c+d\,x^n)\,\text{ArcTanh}\Big[\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]-$$

$$2\,\Big(c+\text{ArcCos}\Big[-\frac{b}{a}\Big]\Big)\,\text{ArcTanh}\Big[\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]+$$

$$\Bigg(\text{ArcCos}\Big[-\frac{b}{a}\Big]-2\,i\,\text{ArcTanh}\Big[\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]+$$

$$2\,i\,\text{ArcTanh}\Big[\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]\Bigg)\,\text{Log}\Big[\frac{\sqrt{a^2-b^2}\,e^{-\frac{1}{2}\,i\,(c+d\,x^n)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}[c+d\,x^n]}}\Big]+$$

$$\Bigg(\text{ArcCos}\Big[-\frac{b}{a}\Big]+2\,i\,\Bigg(\text{ArcTanh}\Big[\frac{(a+b)\,\text{Cot}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]-$$

$$\text{ArcTanh}\Big[\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]\Bigg)\Bigg)\,\text{Log}\Big[\frac{\sqrt{a^2-b^2}\,e^{\frac{1}{2}\,i\,(c+d\,x^n)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}[c+d\,x^n]}}\Big]-$$

$$\Bigg(\text{ArcCos}\Big[-\frac{b}{a}\Big]-2\,i\,\text{ArcTanh}\Big[\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]\Bigg)$$

$$\text{Log}\Big[\frac{(a+b)\,\left(a-b-i\,\sqrt{a^2-b^2}\right)\,\left(1+i\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}{a\,\left(a+b+\sqrt{a^2-b^2}\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}\Big]-$$

$$\Bigg(\text{ArcCos}\Big[-\frac{b}{a}\Big]+2\,i\,\text{ArcTanh}\Big[\frac{(a-b)\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]}{\sqrt{a^2-b^2}}\Big]\Bigg)$$

$$\text{Log}\Big[\frac{(a+b)\,\left(-i\,a+i\,b+\sqrt{a^2-b^2}\right)\,\left(i+\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}{a\,\left(a+b+\sqrt{a^2-b^2}\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}\Big]+$$

$$i\,\Bigg(\text{PolyLog}\Big[2,\frac{\left(b-i\,\sqrt{a^2-b^2}\right)\,\left(a+b-\sqrt{a^2-b^2}\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}{a\,\left(a+b+\sqrt{a^2-b^2}\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}\Big]-$$

$$\text{PolyLog}\Big[2,\frac{\left(b+i\,\sqrt{a^2-b^2}\right)\,\left(a+b-\sqrt{a^2-b^2}\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}{a\,\left(a+b+\sqrt{a^2-b^2}\,\text{Tan}\big[\frac{1}{2}\,(c+d\,x^n)\big]\right)}\Big]\Bigg)\Bigg)\Bigg)\,\text{Sec}[c+d\,x^n]$$

Problem 80: Unable to integrate problem.

$$\int\frac{(e\,x)^{-1+3\,n}}{a+b\,\text{Sec}[c+d\,x^n]}\,dx$$

Optimal (type 4, 485 leaves, 14 steps):

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

Result (type 8, 26 leaves):

$$\int\frac{(e\,x)^{-1+3n}}{a+b\,\text{Sec}[c+d\,x^n]}\,dx$$

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

$$\int\frac{(e\,x)^{-1+2n}}{(a+b\,\text{Sec}[c+d\,x^n])^2}\,dx$$

Optimal (type 4, 757 leaves, 23 steps):

$$\frac{(e\,x)^{2n}}{2\,a^2\,e\,n}-\frac{i\,b^3\,x^{-n}\,(e\,x)^{2n}\,\text{Log}\left[1+\frac{a\,e^{i\,(c+d\,x^n)}}{b-\sqrt{-a^2+b^2}}\right]}{a^2\,(-a^2+b^2)^{3/2}\,d\,e\,n}+\frac{2\,i\,b\,x^{-n}\,(e\,x)^{2n}\,\text{Log}\left[1+\frac{a\,e^{i\,(c+d\,x^n)}}{b-\sqrt{-a^2+b^2}}\right]}{a^2\,\sqrt{-a^2+b^2}\,d\,e\,n}+$$
$$\frac{i\,b^3\,x^{-n}\,(e\,x)^{2n}\,\text{Log}\left[1+\frac{a\,e^{i\,(c+d\,x^n)}}{b+\sqrt{-a^2+b^2}}\right]}{a^2\,(-a^2+b^2)^{3/2}\,d\,e\,n}-\frac{2\,i\,b\,x^{-n}\,(e\,x)^{2n}\,\text{Log}\left[1+\frac{a\,e^{i\,(c+d\,x^n)}}{b+\sqrt{-a^2+b^2}}\right]}{a^2\,\sqrt{-a^2+b^2}\,d\,e\,n}+$$
$$\frac{b^2\,x^{-2n}\,(e\,x)^{2n}\,\text{Log}[b+a\,\text{Cos}[c+d\,x^n]]}{a^2\,(a^2-b^2)\,d^2\,e\,n}-\frac{b^3\,x^{-2n}\,(e\,x)^{2n}\,\text{PolyLog}\left[2,-\frac{a\,e^{i\,(c+d\,x^n)}}{b-\sqrt{-a^2+b^2}}\right]}{a^2\,(-a^2+b^2)^{3/2}\,d^2\,e\,n}+$$
$$\frac{2\,b\,x^{-2n}\,(e\,x)^{2n}\,\text{PolyLog}\left[2,-\frac{a\,e^{i\,(c+d\,x^n)}}{b-\sqrt{-a^2+b^2}}\right]}{a^2\,\sqrt{-a^2+b^2}\,d^2\,e\,n}+\frac{b^3\,x^{-2n}\,(e\,x)^{2n}\,\text{PolyLog}\left[2,-\frac{a\,e^{i\,(c+d\,x^n)}}{b+\sqrt{-a^2+b^2}}\right]}{a^2\,(-a^2+b^2)^{3/2}\,d^2\,e\,n}-$$
$$\frac{2\,b\,x^{-2n}\,(e\,x)^{2n}\,\text{PolyLog}\left[2,-\frac{a\,e^{i\,(c+d\,x^n)}}{b+\sqrt{-a^2+b^2}}\right]}{a^2\,\sqrt{-a^2+b^2}\,d^2\,e\,n}+\frac{b^2\,x^{-n}\,(e\,x)^{2n}\,\text{Sin}[c+d\,x^n]}{a\,(a^2-b^2)\,d\,e\,n\,(b+a\,\text{Cos}[c+d\,x^n])}$$

Result (type 4, 2450 leaves):

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

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

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

$$\text{Log}\left[\frac{\sqrt{a^2-b^2}\;e^{-\frac{1}{2}i\left(c+d\,x^n\right)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}\left[c+d\,x^n\right]}}\right]+\left(\text{ArcCos}\left[-\frac{b}{a}\right]+\right.$$

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

$$\frac{\sqrt{a^2-b^2}\;e^{\frac{1}{2}i\left(c+d\,x^n\right)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}\left[c+d\,x^n\right]}}\Bigg]-\left(\text{ArcCos}\left[-\frac{b}{a}\right]+2\,i\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]}{\sqrt{a^2-b^2}}\right]\right)$$

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

$$\left(-\text{ArcCos}\left[-\frac{b}{a}\right]+2\,i\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]}{\sqrt{a^2-b^2}}\right]\right)$$

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

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

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

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

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

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

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

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

$$\text{Log}\left[\frac{\sqrt{a^2-b^2}\;e^{-\frac{1}{2}i\left(c+d\,x^n\right)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}\left[c+d\,x^n\right]}}\right]+\left(\text{ArcCos}\left[-\frac{b}{a}\right]+\right.$$

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

$$\text{Log}\left[\frac{\sqrt{a^2-b^2}\;e^{\frac{1}{2}\,i\,\left(c+d\,x^n\right)}}{\sqrt{2}\,\sqrt{a}\,\sqrt{b+a\,\text{Cos}\left[c+d\,x^n\right]}}\right]-\left(\text{ArcCos}\left[-\frac{b}{a}\right]+2\,i\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]}{\sqrt{a^2-b^2}}\right]\right)$$

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

$$\left(-\text{ArcCos}\left[-\frac{b}{a}\right]+2\,i\,\text{ArcTanh}\left[\frac{(a-b)\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]}{\sqrt{a^2-b^2}}\right]\right)$$

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

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

$$\left.\text{PolyLog}\left[2,\frac{\left(b+i\,\sqrt{a^2-b^2}\right)\left(a+b-\sqrt{a^2-b^2}\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]\right)}{a\left(a+b+\sqrt{a^2-b^2}\,\text{Tan}\left[\frac{1}{2}\left(c+d\,x^n\right)\right]\right)}\right]\right)\Bigg)\Bigg)\,\text{Sec}\left[c+d\,x^n\right]^2+$$

$$\left(x^{1-n}\,(e\,x)^{-1+2\,n}\left(b+a\,\text{Cos}\left[c+d\,x^n\right]\right)^2\text{Sec}\left[c+d\,x^n\right]^2\left(a^2\,d\,x^n\,\text{Cos}[c]-b^2\,d\,x^n\,\text{Cos}[c]+2\,b^2\,\text{Sin}[c]\right)\right)\Big/$$

$$\left(2\,a^2\,(a-b)\,(a+b)\,d\,n\left(a+b\,\text{Sec}\left[c+d\,x^n\right]\right)^2\right.$$

$$\left.\left(\text{Cos}\left[\frac{c}{2}\right]-\text{Sin}\left[\frac{c}{2}\right]\right)\left(\text{Cos}\left[\frac{c}{2}\right]+\text{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\Bigg(b^2\,x^{1-2\,n}\,(e\,x)^{-1+2\,n}\left(b+a\,\text{Cos}\left[c+d\,x^n\right]\right)^2\text{Sec}[c]\,\text{Sec}\left[c+d\,x^n\right]^2$$

$$\Bigg(a\,\text{Cos}[c]\,\text{Log}\left[b+a\,\text{Cos}[c]\,\text{Cos}\left[d\,x^n\right]-a\,\text{Sin}[c]\,\text{Sin}\left[d\,x^n\right]\right]+$$

$$a\,d\,x^n\,\text{Sin}[c]-\frac{2\,i\,a\,b\,\text{ArcTan}\left[\frac{-i\,a\,\text{Sin}[c]-i\,(-b+a\,\text{Cos}[c])\,\text{Tan}\left[\frac{d\,x^n}{2}\right]}{\sqrt{-b^2+a^2\,\text{Cos}[c]^2+a^2\,\text{Sin}[c]^2}}\right]\text{Sin}[c]}{\sqrt{-b^2+a^2\,\text{Cos}[c]^2+a^2\,\text{Sin}[c]^2}}\Bigg)\Bigg)\Big/$$

$$\left(a\left(a^2-b^2\right)d^2\,n\left(a+b\,\text{Sec}\left[c+d\,x^n\right]\right)^2\left(a^2\,\text{Cos}[c]^2+a^2\,\text{Sin}[c]^2\right)\right)+$$

$$\left(b^2\,x^{1-n}\,(e\,x)^{-1+2\,n}\left(b+a\,\text{Cos}\left[c+d\,x^n\right]\right)\text{Sec}\left[c+d\,x^n\right]^2\left(b\,\text{Sin}[c]-a\,\text{Sin}\left[d\,x^n\right]\right)\right)\Big/$$

$$\left(a^2 (-a+b) (a+b) d n (a+b \operatorname{Sec}[c+d x^n])^2 \left(\operatorname{Cos}\left[\frac{c}{2}\right]-\operatorname{Sin}\left[\frac{c}{2}\right]\right)\left(\operatorname{Cos}\left[\frac{c}{2}\right]+\operatorname{Sin}\left[\frac{c}{2}\right]\right)\right)+$$

$$\frac{b^2 x^{1-n} (e x)^{-1+2 n} (b+a \operatorname{Cos}[c+d x^n])^2 \operatorname{Sec}[c+d x^n]^2 \operatorname{Tan}[c]}{a^2 (-a^2+b^2) d n (a+b \operatorname{Sec}[c+d x^n])^2}-$$

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

Problem 83: Unable to integrate problem.

$$\int \frac{(e x)^{-1+3 n}}{(a+b \operatorname{Sec}[c+d x^n])^2} \, dx$$

Optimal (type 4, 1384 leaves, 32 steps):

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

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

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

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

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

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

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

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

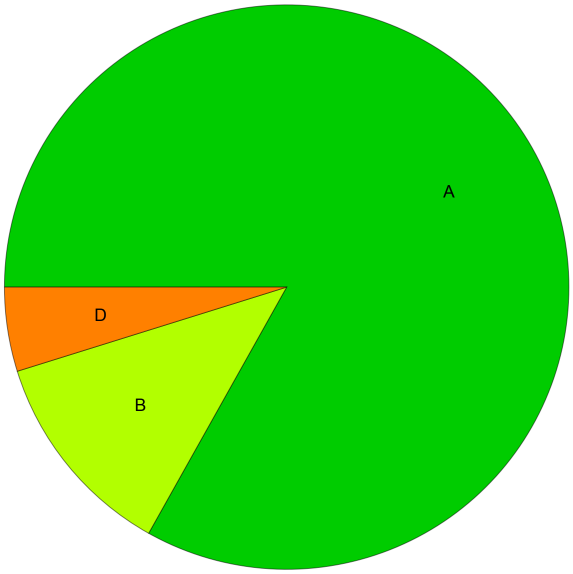
$$\frac{4 i b x^{-3n} (e x)^{3n} \text{PolyLog}\left[3, -\frac{a e^{i (c+d x^n)}}{b+\sqrt{-a^2+b^2}}\right]}{a^2 \sqrt{-a^2+b^2}\, d^3 e n} + \frac{b^2 x^{-n} (e x)^{3n} \text{Sin}[c+d x^n]}{a (a^2-b^2) d e n (b+a \text{Cos}[c+d x^n])}$$

Result (type 8, 26 leaves):

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

Summary of Integration Test Results

83 integration problems



A - 69 optimal antiderivatives

B - 10 more than twice size of optimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 4 unable to integrate problems

E - 0 integration timeouts