Mathematica 11.3 Integration Test Results

Test results for the 20 problems in "4.2.9 trig^m (a+b cos^n+c cos^(2 n))^p.m"

Problem 5: Result unnecessarily involves imaginary or complex numbers.

$$\int \frac{\text{Csc}[x]^3}{a+b\,\text{Cos}[x]+c\,\text{Cos}[x]^2}\,dx$$

Optimal (type 3, 205 leaves, 10 steps):

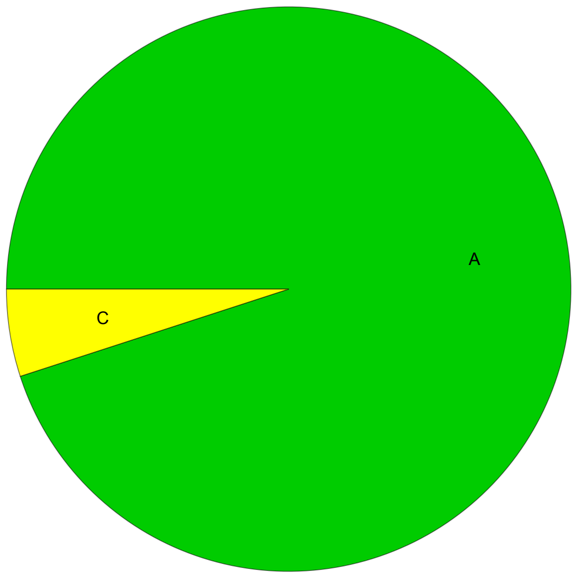
$$\frac{\left(b^4+2 c^2 (a+c)^2-2 b^2 c (2 a+c)\right) \text{ArcTanh}\left[\frac{b+2 c \,\text{Cos}[x]}{\sqrt{b^2-4 a c}}\right]}{\sqrt{b^2-4 a c}\, \left(a^2-b^2+2 a c+c^2\right)^2}+\frac{(b-(a+c) \,\text{Cos}[x]) \,\text{Csc}[x]^2}{2 (a-b+c) (a+b+c)}+\frac{(a+2 b+3 c) \,\text{Log}[1-\text{Cos}[x]]}{4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

Result (type 3, 392 leaves):

$$\frac{1}{8} \left(\frac{16 i \left(b^3-2 b c (a+c)\right) x}{(a-b+c)^2 (a+b+c)^2}+\frac{4 i (a-2 b+3 c) \,\text{ArcTan}[\text{Tan}[x]]}{(a-b+c)^2}-\frac{4 i (a+2 b+3 c) \,\text{ArcTan}[\text{Tan}[x]]}{(a+b+c)^2}-\frac{\text{Csc}\left[\frac{x}{2}\right]^2}{a+b+c}-\frac{2 (a-2 b+3 c) \,\text{Log}\left[\text{Cos}\left[\frac{x}{2}\right]^2\right]}{(a-b+c)^2}-\left(4 \left(b^4+2 c^2 (a+c)^2-2 b^2 c (2 a+c)+b^3 \sqrt{b^2-4 a c}-2 b c (a+c) \sqrt{b^2-4 a c}\right) \text{Log}\left[-b+\sqrt{b^2-4 a c}-2 c \,\text{Cos}[x]\right]\right) \Big/ \left(\sqrt{b^2-4 a c}\, \left(a^2-b^2+2 a c+c^2\right)^2\right)-\left(4 \left(-b^4-2 c^2 (a+c)^2+2 b^2 c (2 a+c)+b^3 \sqrt{b^2-4 a c}-2 b c (a+c) \sqrt{b^2-4 a c}\right) \text{Log}\left[b+\sqrt{b^2-4 a c}+2 c \,\text{Cos}[x]\right]\right) \Big/ \left(\sqrt{b^2-4 a c}\, \left(a^2-b^2+2 a c+c^2\right)^2\right)+\frac{2 (a+2 b+3 c) \,\text{Log}\left[\text{Sin}\left[\frac{x}{2}\right]^2\right]}{(a+b+c)^2}+\frac{\text{Sec}\left[\frac{x}{2}\right]^2}{a-b+c}\right)$$

Summary of Integration Test Results

20 integration problems



A - 19 optimal antiderivatives

B - 0 more than twice size of optimal antiderivatives

C - 1 unnecessarily complex antiderivatives

D - 0 unable to integrate problems

E - 0 integration timeouts