

# Mathematica 11.3 Integration Test Results

Test results for the 32 problems in "4.4.9 trig^m (a+b cot^n+c cot^(2n))^p.m"

Problem 1: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\text{Cot}[d+ex]^5}{\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}} dx$$

Optimal (type 3, 547 leaves, 15 steps):

$$\frac{\sqrt{a-c-\sqrt{a^2+b^2-2ac+c^2}} \text{ArcTanh}\left[\frac{a-c-\sqrt{a^2+b^2-2ac+c^2}+b\text{Cot}[d+ex]}{\sqrt{2}\sqrt{a-c-\sqrt{a^2+b^2-2ac+c^2}}\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}\right]}{\sqrt{2}\sqrt{a^2+b^2-2ac+c^2}e} +$$

$$\frac{\sqrt{a-c+\sqrt{a^2+b^2-2ac+c^2}} \text{ArcTanh}\left[\frac{a-c+\sqrt{a^2+b^2-2ac+c^2}+b\text{Cot}[d+ex]}{\sqrt{2}\sqrt{a-c+\sqrt{a^2+b^2-2ac+c^2}}\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}\right]}{\sqrt{2}\sqrt{a^2+b^2-2ac+c^2}e} -$$

$$\frac{b \text{ArcTanh}\left[\frac{b+2c\text{Cot}[d+ex]}{2\sqrt{c}\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}\right]}{2c^{3/2}e} + \frac{b(5b^2-12ac) \text{ArcTanh}\left[\frac{b+2c\text{Cot}[d+ex]}{2\sqrt{c}\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}\right]}{16c^{7/2}e} +$$

$$\frac{\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}{ce} - \frac{\text{Cot}[d+ex]^2\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}{3ce} -$$

$$\frac{(15b^2-16ac-10bc\text{Cot}[d+ex])\sqrt{a+b\text{Cot}[d+ex]+c\text{Cot}[d+ex]^2}}{24c^3e}$$

Result (type 3, 3681 leaves):

$$\frac{1}{e} \left( \frac{-15b^2+16ac+32c^2}{24c^3} + \frac{5b\text{Cot}[d+ex]}{12c^2} - \frac{\text{Csc}[d+ex]^2}{3c} \right)$$

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

$$\left( \left( b\sqrt{a-ib-c}\sqrt{a+ib-c}(-5b^2+4c(3a+2c)) \text{Log}[\text{Tan}[d+ex]] - \right. \right.$$

$$\left. \left. 8\sqrt{a+ib-c}c^{7/2} \text{Log}\left[(-2c-2ia\text{Tan}[d+ex]-b(i+\text{Tan}[d+ex])+2i\sqrt{a-ib-c})\right] \right)$$

$$\begin{aligned}
 & \left. \left( \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])} \right) / \left( 8 \sqrt{a - i b - c} c^3 (-i + \tan[d + ex]) \right) \right) + \\
 & \sqrt{a - i b - c} \left( b \sqrt{a + i b - c} (5 b^2 - 4 c (3 a + 2 c)) \text{Log}[2 c + b \tan[d + ex] + \right. \\
 & \quad \left. 2 \sqrt{c} \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])} + 8 c^{7/2} \text{Log}[2 c + b (-i + \tan[d + ex]) - \right. \\
 & \quad \left. 2 i (a \tan[d + ex] + \sqrt{a + i b - c} \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])}) \right] / \\
 & \quad \left. \left( 8 \sqrt{a + i b - c} c^3 (i + \tan[d + ex]) \right) \right) \Bigg) \\
 & \left( - \left( \left( 5 b^3 \sqrt{\left( -\frac{a}{-1 + \cos[2 (d + ex)]} - \frac{c}{-1 + \cos[2 (d + ex)]} + \frac{a \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \frac{c \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \frac{b \sin[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} \right) \right) / \right. \\
 & \quad \left. \left( 8 c^3 (a + c - a \cos[2 (d + ex)] + c \cos[2 (d + ex)] + b \sin[2 (d + ex)]) \right) \right) + \\
 & \left( 3 a b \sqrt{\left( -\frac{a}{-1 + \cos[2 (d + ex)]} - \frac{c}{-1 + \cos[2 (d + ex)]} + \frac{a \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \right. \right. \\
 & \quad \left. \left. \frac{c \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \frac{b \sin[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} \right) \right) / \\
 & \quad \left( 2 c^2 (a + c - a \cos[2 (d + ex)] + c \cos[2 (d + ex)] + b \sin[2 (d + ex)]) \right) + \\
 & \left( b \sqrt{\left( -\frac{a}{-1 + \cos[2 (d + ex)]} - \frac{c}{-1 + \cos[2 (d + ex)]} + \frac{a \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \right. \right. \\
 & \quad \left. \left. \frac{c \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \frac{b \sin[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} \right) \right) / \\
 & \quad \left( c (a + c - a \cos[2 (d + ex)] + c \cos[2 (d + ex)] + b \sin[2 (d + ex)]) \right) + \\
 & \left( \sin[2 (d + ex)] \sqrt{\left( -\frac{a}{-1 + \cos[2 (d + ex)]} - \frac{c}{-1 + \cos[2 (d + ex)]} + \right. \right. \\
 & \quad \left. \left. \frac{a \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \frac{c \cos[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} - \frac{b \sin[2 (d + ex)]}{-1 + \cos[2 (d + ex)]} \right) \right) / \\
 & \quad \left( a + c - a \cos[2 (d + ex)] + c \cos[2 (d + ex)] + b \sin[2 (d + ex)] \right) \Bigg) \\
 & \tan[d + ex] \sqrt{a + \cot[d + ex]^2 (c + b \tan[d + ex])} \Bigg) / \left( 16 \right. \\
 & \quad \sqrt{a - i b - c} \\
 & \quad \sqrt{a + i b - c} \\
 & \quad c^{7/2} \\
 & \quad e \\
 & \quad \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])} \\
 & \quad \left( - \left( \left( b \sqrt{a - i b - c} \sqrt{a + i b - c} (-5 b^2 + 4 c (3 a + 2 c)) \text{Log}[\tan[d + ex]] - \right. \right. \right.
 \end{aligned}$$

$$\begin{aligned}
 & 8 \sqrt{a+ib-c} c^{7/2} \text{Log} \left[ \left( -2c - 2ia \tan[d+ex] - b(i + \tan[d+ex]) + \right. \right. \\
 & \quad \left. \left. 2i \sqrt{a-ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right] / \left( 8 \sqrt{a-ib-c} c^3 \right. \\
 & \quad \left. (-i + \tan[d+ex]) \right) + \sqrt{a-ib-c} \left( b \sqrt{a+ib-c} (5b^2 - 4c(3a+2c)) \right. \\
 & \quad \left. \text{Log} [2c + b \tan[d+ex] + 2\sqrt{c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])}] + \right. \\
 & \quad \left. 8c^{7/2} \text{Log} \left[ \left( 2c + b(-i + \tan[d+ex]) - 2i \left( a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right) \right] \right) / \left( 8 \sqrt{a+ib-c} c^3 \right. \\
 & \quad \left. (i + \tan[d+ex]) \right) \right) \tan[d+ex] (a \sec[d+ex]^2 \tan[d+ex] + \\
 & \quad \sec[d+ex]^2 (b+a \tan[d+ex])) \sqrt{a+\cot[d+ex]^2 (c+b \tan[d+ex])} \Big/ \\
 & \left( 32 \sqrt{a-ib-c} \sqrt{a+ib-c} c^{7/2} (c + \tan[d+ex] (b+a \tan[d+ex]))^{3/2} \right) + \\
 & \left( \left( b \sqrt{a-ib-c} \sqrt{a+ib-c} (-5b^2 + 4c(3a+2c)) \text{Log}[\tan[d+ex]] - \right. \right. \\
 & \quad 8 \sqrt{a+ib-c} c^{7/2} \text{Log} \left[ \left( -2c - 2ia \tan[d+ex] - b(i + \tan[d+ex]) + \right. \right. \\
 & \quad \left. \left. 2i \sqrt{a-ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right] / \left( 8 \sqrt{a-ib-c} c^3 \right. \\
 & \quad \left. (-i + \tan[d+ex]) \right) + \sqrt{a-ib-c} \left( b \sqrt{a+ib-c} (5b^2 - 4c(3a+2c)) \text{Log} [ \right. \\
 & \quad \left. 2c + b \tan[d+ex] + 2\sqrt{c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right] + \\
 & \quad \left. 8c^{7/2} \text{Log} \left[ \left( 2c + b(-i + \tan[d+ex]) - 2i \left( a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right) \right] \right) / \left( 8 \sqrt{a+ib-c} c^3 (i + \right. \\
 & \quad \left. \tan[d+ex]) \right) \right) \sec[d+ex]^2 \sqrt{a+\cot[d+ex]^2 (c+b \tan[d+ex])} \Big/ \\
 & \left( 16 \sqrt{a-ib-c} \sqrt{a+ib-c} c^{7/2} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) + \\
 & \left( \left( b \sqrt{a-ib-c} \sqrt{a+ib-c} (-5b^2 + 4c(3a+2c)) \text{Log}[\tan[d+ex]] - \right. \right. \\
 & \quad 8 \sqrt{a+ib-c} c^{7/2} \text{Log} \left[ \left( -2c - 2ia \tan[d+ex] - b(i + \tan[d+ex]) + \right. \right. \\
 & \quad \left. \left. 2i \sqrt{a-ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right] / \left( 8 \sqrt{a-ib-c} c^3 \right. \\
 & \quad \left. (-i + \tan[d+ex]) \right) + \sqrt{a-ib-c} \left( b \sqrt{a+ib-c} (5b^2 - 4c(3a+2c)) \text{Log} [ \right. \\
 & \quad \left. 2c + b \tan[d+ex] + 2\sqrt{c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right] + \\
 & \quad \left. 8c^{7/2} \text{Log} \left[ \left( 2c + b(-i + \tan[d+ex]) - 2i \left( a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right) \right] \right) / \left( 8 \sqrt{a+ib-c} c^3 (i + \right. \\
 & \quad \left. \tan[d+ex]) \right) \right) \tan[d+ex] \\
 & \left. (b \csc[d+ex]^2 - 2 \cot[d+ex] \csc[d+ex]^2 (c+b \tan[d+ex])) \right) \Big/
 \end{aligned}$$

$$\begin{aligned}
& \left( 32 \sqrt{a - i b - c} \sqrt{a + i b - c} c^{7/2} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right. \\
& \quad \left. \sqrt{a + \cot[d + ex]^2 (c + b \tan[d + ex])} \right) + \\
& \left( \tan[d + ex] \sqrt{a + \cot[d + ex]^2 (c + b \tan[d + ex])} \left( b \sqrt{a - i b - c} \sqrt{a + i b - c} \right. \right. \\
& \quad \left. \left. (-5b^2 + 4c(3a + 2c)) \operatorname{Csc}[d + ex] \operatorname{Sec}[d + ex] - \left( 64 \sqrt{a - i b - c} \sqrt{a + i b - c} \right. \right. \right. \\
& \quad \left. \left. c^{13/2} (-i + \tan[d + ex]) \left( \left( -2i a \operatorname{Sec}[d + ex]^2 - b \operatorname{Sec}[d + ex]^2 + (i \sqrt{a - i b - c} \right. \right. \right. \right. \\
& \quad \left. \left. \left. (a \operatorname{Sec}[d + ex]^2 \tan[d + ex] + \operatorname{Sec}[d + ex]^2 (b + a \tan[d + ex])) \right) \right) \right) \right) / \\
& \quad \left( \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) / \left( 8 \sqrt{a - i b - c} c^3 \right. \\
& \quad \left. (-i + \tan[d + ex]) \right) - \left( \operatorname{Sec}[d + ex]^2 \left( -2c - 2i a \tan[d + ex] - b (i + \tan[d + ex]) \right. \right. \\
& \quad \left. \left. + 2i \sqrt{a - i b - c} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) \right) / \\
& \quad \left( 8 \sqrt{a - i b - c} c^3 (-i + \tan[d + ex])^2 \right) / \left( -2c - 2i a \tan[d + ex] - \right. \\
& \quad \left. b (i + \tan[d + ex]) + 2i \sqrt{a - i b - c} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) + \\
& \sqrt{a - i b - c} \left( \left( b \sqrt{a + i b - c} (5b^2 - 4c(3a + 2c)) (b \operatorname{Sec}[d + ex]^2 + \right. \right. \\
& \quad \left. \left. (\sqrt{c} (a \operatorname{Sec}[d + ex]^2 \tan[d + ex] + \operatorname{Sec}[d + ex]^2 (b + a \tan[d + ex]))) \right) \right) / \\
& \quad \left( \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) / \left( 2c + b \tan[d + ex] + \right. \\
& \quad \left. 2 \sqrt{c} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) + \left( 64 \sqrt{a + i b - c} c^{13/2} (i + \tan[d + ex]) \right. \\
& \quad \left. e x \right) \left( \left( b \operatorname{Sec}[d + ex]^2 - 2i (a \operatorname{Sec}[d + ex]^2 + (\sqrt{a + i b - c} (a \operatorname{Sec}[d + ex]^2 \right. \right. \right. \\
& \quad \left. \left. \left. \tan[d + ex] + \operatorname{Sec}[d + ex]^2 (b + a \tan[d + ex])) \right) \right) \right) / \left( 2 \right. \\
& \quad \left. \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) / \left( 8 \sqrt{a + i b - c} c^3 (i + \right. \\
& \quad \left. \tan[d + ex]) \right) - \left( \operatorname{Sec}[d + ex]^2 \left( 2c + b (-i + \tan[d + ex]) - 2i (a \tan[d + ex] \right. \right. \\
& \quad \left. \left. + \sqrt{a + i b - c} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) \right) / \\
& \quad \left( 8 \sqrt{a + i b - c} c^3 (i + \tan[d + ex])^2 \right) / \left( 2c + b (-i + \tan[d + ex]) - \right. \\
& \quad \left. 2i (a \tan[d + ex] + \sqrt{a + i b - c} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex])) \right) / \\
& \quad \left( 16 \sqrt{a - i b - c} \sqrt{a + i b - c} c^{7/2} \sqrt{c + \tan[d + ex]} (b + a \tan[d + ex]) \right) / \left. \right)
\end{aligned}$$

**Problem 2: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cot}[d+ex]^3}{\sqrt{a+b \text{Cot}[d+ex]+c \text{Cot}[d+ex]^2}} dx$$

Optimal (type 3, 384 leaves, 11 steps):

$$\left( \sqrt{a-c-\sqrt{a^2+b^2-2ac+c^2}} \text{ArcTanh}\left[\frac{a-c-\sqrt{a^2+b^2-2ac+c^2}+b \text{Cot}[d+ex]}{\sqrt{2}\sqrt{a-c-\sqrt{a^2+b^2-2ac+c^2}}\sqrt{a+b \text{Cot}[d+ex]+c \text{Cot}[d+ex]^2}}\right] \right) /$$

$$\left( \sqrt{2}\sqrt{a^2+b^2-2ac+c^2} e \right) - \left( \sqrt{a-c+\sqrt{a^2+b^2-2ac+c^2}} \text{ArcTanh}\left[\frac{a-c+\sqrt{a^2+b^2-2ac+c^2}+b \text{Cot}[d+ex]}{\sqrt{2}\sqrt{a-c+\sqrt{a^2+b^2-2ac+c^2}}\sqrt{a+b \text{Cot}[d+ex]+c \text{Cot}[d+ex]^2}}\right] \right) /$$

$$\left( \sqrt{2}\sqrt{a^2+b^2-2ac+c^2} e \right) + \frac{b \text{ArcTanh}\left[\frac{b+2c \text{Cot}[d+ex]}{2\sqrt{c}\sqrt{a+b \text{Cot}[d+ex]+c \text{Cot}[d+ex]^2}}\right]}{2c^{3/2}e} -$$

$$\frac{\sqrt{a+b \text{Cot}[d+ex]+c \text{Cot}[d+ex]^2}}{ce}$$

Result (type 3, 3144 leaves):

$$\frac{\sqrt{\frac{-a-c+a \cos[2(d+ex)]-c \cos[2(d+ex)]-b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]}}}{ce} -$$

$$\left( \left( b \sqrt{a-ib-c} \sqrt{a+ib-c} \log[\tan[d+ex]] - \sqrt{a+ib-c} c^{3/2} \log\left[ \frac{-2c-2ia \tan[d+ex]-b(i+\tan[d+ex])+2i\sqrt{a-ib-c}\sqrt{c+\tan[d+ex]}(b+a \tan[d+ex])}{(\sqrt{a-ib-c}c(-i+\tan[d+ex]))} \right] + \sqrt{a-ib-c} \right. \right.$$

$$\left. \left. (-b\sqrt{a+ib-c} \log[2c+b \tan[d+ex]] + 2\sqrt{c}\sqrt{c+\tan[d+ex]}(b+a \tan[d+ex])) + c^{3/2} \log\left[ \frac{2c+b(-i+\tan[d+ex]) - 2i(a \tan[d+ex] + \sqrt{a+ib-c}\sqrt{c+\tan[d+ex]}(b+a \tan[d+ex]))}{(\sqrt{a+ib-c}c(i+\tan[d+ex]))} \right] \right) \right) /$$

$$\left( - \left( \left( b \sqrt{\left[ -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} \right]} \right) \right) \right)$$

$$\begin{aligned}
 & \left. \left( \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / \\
 & \left( c(a+c-a\cos[2(d+ex)]+c\cos[2(d+ex)]+b\sin[2(d+ex)]) \right) - \\
 & \left( \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right)} \right) / \\
 & \left( a+c-a\cos[2(d+ex)]+c\cos[2(d+ex)]+b\sin[2(d+ex)] \right) \\
 & \text{Tan}[d+ex] \sqrt{a+\text{Cot}[d+ex]^2(c+b\text{Tan}[d+ex])} \Big) / (2 \\
 & \sqrt{a-ib-c} \\
 & \sqrt{a+ib-c} \\
 & c^{3/2} \\
 & e \\
 & \sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \\
 & \left( \left( b\sqrt{a-ib-c}\sqrt{a+ib-c}\text{Log}[\text{Tan}[d+ex]] - \right. \right. \\
 & \left. \left. \sqrt{a+ib-c}c^{3/2}\text{Log}\left[ \left( -2c-2ia\text{Tan}[d+ex]-b(i+\text{Tan}[d+ex])+2i\sqrt{a-ib-c} \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \right) \right] / \left( \sqrt{a-ib-c}c(-i+\text{Tan}[d+ex]) \right) \right) + \\
 & \sqrt{a-ib-c} \left( -b\sqrt{a+ib-c}\text{Log}[2c+b\text{Tan}[d+ex]+2\sqrt{c} \right. \\
 & \left. \sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \right] + c^{3/2}\text{Log}\left[ \left( 2c+b(-i+\text{Tan}[d+ex]) - \right. \right. \\
 & \left. \left. 2i(a\text{Tan}[d+ex]+\sqrt{a+ib-c}\sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \right) \right) \Big) / \\
 & \left( \sqrt{a+ib-c}c(i+\text{Tan}[d+ex]) \right) \Big) \text{Tan}[d+ex] \\
 & (a\text{Sec}[d+ex]^2\text{Tan}[d+ex]+\text{Sec}[d+ex]^2(b+a\text{Tan}[d+ex])) \\
 & \sqrt{a+\text{Cot}[d+ex]^2(c+b\text{Tan}[d+ex])} \Big) / \\
 & (4\sqrt{a-ib-c}\sqrt{a+ib-c}c^{3/2}(c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex]))^{3/2}) - \\
 & \left( b\sqrt{a-ib-c}\sqrt{a+ib-c}\text{Log}[\text{Tan}[d+ex]] - \right. \\
 & \left. \sqrt{a+ib-c}c^{3/2}\text{Log}\left[ \left( -2c-2ia\text{Tan}[d+ex]-b(i+\text{Tan}[d+ex])+2i\sqrt{a-ib-c} \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \right) \right] / \left( \sqrt{a-ib-c}c(-i+\text{Tan}[d+ex]) \right) \right) + \\
 & \sqrt{a-ib-c} \left( -b\sqrt{a+ib-c}\text{Log}[2c+b\text{Tan}[d+ex]+2\sqrt{c} \right. \\
 & \left. \sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \right] + c^{3/2}\text{Log}\left[ \left( 2c+b(-i+\text{Tan}[d+ex]) - \right. \right. \\
 & \left. \left. 2i(a\text{Tan}[d+ex]+\sqrt{a+ib-c}\sqrt{c+\text{Tan}[d+ex](b+a\text{Tan}[d+ex])} \right) \right) \Big) / \\
 & \left( \sqrt{a+ib-c}c(i+\text{Tan}[d+ex]) \right) \Big) \text{Tan}[d+ex]
 \end{aligned}$$

$$\begin{aligned}
 & \left( \sqrt{a+ib-c} c (i + \tan[d+ex]) \right) \left] \right) \sec[d+ex]^2 \\
 & \sqrt{a + \cot[d+ex]^2 (c + b \tan[d+ex])} \Big/ \left( 2 \sqrt{a-ib-c} \sqrt{a+ib-c} \right. \\
 & \left. c^{3/2} \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) - \\
 & \left( \left( b \sqrt{a-ib-c} \sqrt{a+ib-c} \log[\tan[d+ex]] - \sqrt{a+ib-c} c^{3/2} \right. \right. \\
 & \quad \left. \left. \log \left[ \left( -2c - 2ia \tan[d+ex] - b (i + \tan[d+ex]) + 2i \sqrt{a-ib-c} \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) \right] \Big/ \left( \sqrt{a-ib-c} c (-i + \tan[d+ex]) \right) \right) + \\
 & \sqrt{a-ib-c} \left( -b \sqrt{a+ib-c} \log[2c + b \tan[d+ex] + 2\sqrt{c} \right. \\
 & \quad \left. \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right] + c^{3/2} \log \left[ \left( 2c + b (-i + \tan[d+ex]) - \right. \right. \\
 & \quad \left. \left. 2i (a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])}) \right) \right] \Big/ \\
 & \left. \left( \sqrt{a+ib-c} c (i + \tan[d+ex]) \right) \right) \tan[d+ex] \\
 & \left( b \csc[d+ex]^2 - 2 \cot[d+ex] \csc[d+ex]^2 (c + b \tan[d+ex]) \right) \Big/ \\
 & \left( 4 \sqrt{a-ib-c} \sqrt{a+ib-c} c^{3/2} \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right. \\
 & \left. \sqrt{a + \cot[d+ex]^2 (c + b \tan[d+ex])} \right) - \\
 & \left( \tan[d+ex] \sqrt{a + \cot[d+ex]^2 (c + b \tan[d+ex])} \right. \\
 & \left( b \sqrt{a-ib-c} \sqrt{a+ib-c} \csc[d+ex] \sec[d+ex] - \left( \sqrt{a-ib-c} \sqrt{a+ib-c} c^{5/2} \right. \right. \\
 & \quad \left. \left. (-i + \tan[d+ex]) \left( \left( -2ia \sec[d+ex]^2 - b \sec[d+ex]^2 + (i \sqrt{a-ib-c} \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (a \sec[d+ex]^2 \tan[d+ex] + \sec[d+ex]^2 (b + a \tan[d+ex])) \right) \right) \Big/ \right. \\
 & \quad \left. \left( \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) \right) \Big/ \left( \sqrt{a-ib-c} c (-i + \tan[ \right. \\
 & \quad \left. d+ex]) \right) - \left( \sec[d+ex]^2 \left( -2c - 2ia \tan[d+ex] - b (i + \tan[d+ex]) + \right. \right. \\
 & \quad \left. \left. 2i \sqrt{a-ib-c} \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) \right) \Big/ \\
 & \quad \left. \left( \sqrt{a-ib-c} c (-i + \tan[d+ex])^2 \right) \right) \Big/ \left( -2c - 2ia \tan[d+ex] - \right. \\
 & \quad \left. b (i + \tan[d+ex]) + 2i \sqrt{a-ib-c} \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) + \\
 & \sqrt{a-ib-c} \left( - \left( \left( b \sqrt{a+ib-c} \left( b \sec[d+ex]^2 + \left( \sqrt{c} (a \sec[d+ex]^2 \right. \right. \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \tan[d+ex] + \sec[d+ex]^2 (b + a \tan[d+ex]) \right) \right) \right) \Big/ \right. \\
 & \quad \left. \left( \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) \right) \Big/ \left( 2c + b \tan[d+ex] + \right. \\
 & \quad \left. 2\sqrt{c} \sqrt{c + \tan[d+ex] (b + a \tan[d+ex])} \right) \Big) + \left( \sqrt{a+ib-c} c^{5/2} (i + \right.
 \end{aligned}$$

$$\begin{aligned} & \text{Tan}[d+ex] \left( \left( \left( b \text{Sec}[d+ex]^2 - 2i \left( a \text{Sec}[d+ex]^2 + \left( \sqrt{a+ib-c} \left( a \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + \text{Sec}[d+ex]^2 (b+a \text{Tan}[d+ex]) \right) \right) \right) \right) \right) / \right. \\ & \left. \left( 2 \sqrt{c+\text{Tan}[d+ex] (b+a \text{Tan}[d+ex])} \right) \right) / \left( \sqrt{a+ib-c} c (i + \right. \\ & \left. \text{Tan}[d+ex]) \right) - \left( \text{Sec}[d+ex]^2 \left( 2c+b (-i+\text{Tan}[d+ex]) - 2i \left( a \text{Tan}[d+ex] + \sqrt{a+ib-c} \sqrt{c+\text{Tan}[d+ex] (b+a \text{Tan}[d+ex])} \right) \right) \right) / \\ & \left( \sqrt{a+ib-c} c (i+\text{Tan}[d+ex])^2 \right) \right) / \left( 2c+b (-i+\text{Tan}[d+ex]) - \right. \\ & \left. 2i \left( a \text{Tan}[d+ex] + \sqrt{a+ib-c} \sqrt{c+\text{Tan}[d+ex] (b+a \text{Tan}[d+ex])} \right) \right) \right) / \\ & \left( 2 \sqrt{a-ib-c} \sqrt{a+ib-c} c^{3/2} \sqrt{c+\text{Tan}[d+ex] (b+a \text{Tan}[d+ex])} \right) \end{aligned}$$

**Problem 3: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cot}[d+ex]}{\sqrt{a+b \text{Cot}[d+ex] + c \text{Cot}[d+ex]^2}} dx$$

Optimal (type 3, 294 leaves, 6 steps):

$$\begin{aligned} & - \left( \left( \sqrt{a-c-\sqrt{a^2+b^2-2ac+c^2}} \text{ArcTanh} \left[ \left( a-c-\sqrt{a^2+b^2-2ac+c^2} + b \text{Cot}[d+ex] \right) \right] / \right. \right. \\ & \left. \left( \sqrt{2} \sqrt{a-c-\sqrt{a^2+b^2-2ac+c^2}} \sqrt{a+b \text{Cot}[d+ex] + c \text{Cot}[d+ex]^2} \right) \right) \right) / \\ & \left( \sqrt{2} \sqrt{a^2+b^2-2ac+c^2} e \right) + \left( \sqrt{a-c+\sqrt{a^2+b^2-2ac+c^2}} \right. \\ & \left. \text{ArcTanh} \left[ \left( a-c+\sqrt{a^2+b^2-2ac+c^2} + b \text{Cot}[d+ex] \right) \right] / \left( \sqrt{2} \sqrt{a-c+\sqrt{a^2+b^2-2ac+c^2}} \right. \right. \\ & \left. \left. \sqrt{a+b \text{Cot}[d+ex] + c \text{Cot}[d+ex]^2} \right) \right) \right) / \left( \sqrt{2} \sqrt{a^2+b^2-2ac+c^2} e \right) \end{aligned}$$

Result (type 3, 2104 leaves):

$$\begin{aligned} & - \left( \left( \left( \sqrt{a-ib-c} \text{Log} \left[ 2 \left( \frac{b (-i+\text{Tan}[d+ex]) + 2 (c-ia \text{Tan}[d+ex])}{\sqrt{a+ib-c}} \right. \right. \right. \right. \right. \\ & \left. \left. \left. \left. 2i \sqrt{c+\text{Tan}[d+ex] (b+a \text{Tan}[d+ex])} \right) \right] \right) \right) / (i+\text{Tan}[d+ex]) \right) - \end{aligned}$$



$$\begin{aligned}
 & \sqrt{a+ib-c} \operatorname{Log}\left[2\left(-\frac{b(i+\operatorname{Tan}[d+ex])}{\sqrt{a-ib-c}}+2\frac{(c+ia\operatorname{Tan}[d+ex])}{\sqrt{a-ib-c}}+2i\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)\right]/(-i+\operatorname{Tan}[d+ex]) \\
 & \operatorname{Sin}[2(d+ex)]\sqrt{\left(-\frac{a}{-1+\operatorname{Cos}[2(d+ex)]}-\frac{c}{-1+\operatorname{Cos}[2(d+ex)]}+\frac{a\operatorname{Cos}[2(d+ex)]}{-1+\operatorname{Cos}[2(d+ex)]}-\frac{c\operatorname{Cos}[2(d+ex)]}{-1+\operatorname{Cos}[2(d+ex)]}-\frac{b\operatorname{Sin}[2(d+ex)]}{-1+\operatorname{Cos}[2(d+ex)]}\right)} \\
 & \operatorname{Tan}[d+ex]\sqrt{a+\operatorname{Cot}[d+ex]^2(c+b\operatorname{Tan}[d+ex])} \\
 & \left(2\sqrt{a-ib-c}\sqrt{a+ib-c}e^{(-a-c+(a-c)\operatorname{Cos}[2(d+ex)]-b\operatorname{Sin}[2(d+ex)])}\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right. \\
 & \left.-\left(1/\left(4\sqrt{a-ib-c}\sqrt{a+ib-c}(c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])\right)^{3/2}\right)\right) \\
 & \left(\sqrt{a-ib-c}\operatorname{Log}\left[2\left(\frac{b(-i+\operatorname{Tan}[d+ex])}{\sqrt{a+ib-c}}+2\frac{(c-ia\operatorname{Tan}[d+ex])}{\sqrt{a+ib-c}}-2i\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)\right]/(i+\operatorname{Tan}[d+ex])\right)- \\
 & \left(\sqrt{a+ib-c}\operatorname{Log}\left[2\left(-\frac{b(i+\operatorname{Tan}[d+ex])}{\sqrt{a-ib-c}}+2\frac{(c+ia\operatorname{Tan}[d+ex])}{\sqrt{a-ib-c}}+2i\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)\right]/(-i+\operatorname{Tan}[d+ex])\right) \\
 & \operatorname{Tan}[d+ex](a\operatorname{Sec}[d+ex]^2\operatorname{Tan}[d+ex]+\operatorname{Sec}[d+ex]^2(b+a\operatorname{Tan}[d+ex]))\sqrt{a+\operatorname{Cot}[d+ex]^2(c+b\operatorname{Tan}[d+ex])}+ \\
 & \left(\left(\sqrt{a-ib-c}\operatorname{Log}\left[2\left(\frac{b(-i+\operatorname{Tan}[d+ex])}{\sqrt{a+ib-c}}+2\frac{(c-ia\operatorname{Tan}[d+ex])}{\sqrt{a+ib-c}}-2i\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)\right]/(i+\operatorname{Tan}[d+ex])\right)-\right. \\
 & \left.\sqrt{a+ib-c}\operatorname{Log}\left[2\left(-\frac{b(i+\operatorname{Tan}[d+ex])}{\sqrt{a-ib-c}}+2\frac{(c+ia\operatorname{Tan}[d+ex])}{\sqrt{a-ib-c}}+2i\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)\right]/(-i+\operatorname{Tan}[d+ex])\right) \\
 & \operatorname{Sec}[d+ex]^2\sqrt{a+\operatorname{Cot}[d+ex]^2(c+b\operatorname{Tan}[d+ex])} \\
 & \left(2\sqrt{a-ib-c}\sqrt{a+ib-c}\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)+ \\
 & \left(\left(\sqrt{a-ib-c}\operatorname{Log}\left[2\left(\frac{b(-i+\operatorname{Tan}[d+ex])}{\sqrt{a+ib-c}}+2\frac{(c-ia\operatorname{Tan}[d+ex])}{\sqrt{a+ib-c}}-2i\sqrt{c+\operatorname{Tan}[d+ex](b+a\operatorname{Tan}[d+ex])}\right)\right]/(i+\operatorname{Tan}[d+ex])\right)-\right.
 \end{aligned}$$



**Problem 4: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Tan}[d + e x]}{\sqrt{a + b \text{Cot}[d + e x] + c \text{Cot}[d + e x]^2}} dx$$

Optimal (type 3, 349 leaves, 10 steps):

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

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

$$\left. \left. \left(\sqrt{2} \sqrt{a - c - \sqrt{a^2 + b^2 - 2 a c + c^2}} \sqrt{a + b \text{Cot}[d + e x] + c \text{Cot}[d + e x]^2}\right)\right] \right) /$$

$$\left(\sqrt{2} \sqrt{a^2 + b^2 - 2 a c + c^2} e\right) - \left(\sqrt{a - c + \sqrt{a^2 + b^2 - 2 a c + c^2}} \text{ArcTanh}\left[\left(a - c + \sqrt{a^2 + b^2 - 2 a c + c^2} + b \text{Cot}[d + e x]\right) / \left(\sqrt{2} \sqrt{a - c + \sqrt{a^2 + b^2 - 2 a c + c^2}} \sqrt{a + b \text{Cot}[d + e x] + c \text{Cot}[d + e x]^2}\right)\right] \right) / \left(\sqrt{2} \sqrt{a^2 + b^2 - 2 a c + c^2} e\right)$$

Result (type 4, 64 621 leaves): Display of huge result suppressed!

**Problem 5: Humongous result has more than 200000 leaves.**

$$\int \frac{\text{Tan}[d + e x]^3}{\sqrt{a + b \text{Cot}[d + e x] + c \text{Cot}[d + e x]^2}} dx$$

Optimal (type 3, 501 leaves, 14 steps):

$$\begin{aligned}
 & - \frac{\text{ArcTanh}\left[\frac{2 a+b \cot [d+e x]}{2 \sqrt{a} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{\sqrt{a} e} + \frac{(3 b^2-4 a c) \text{ArcTanh}\left[\frac{2 a+b \cot [d+e x]}{2 \sqrt{a} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{8 a^{5/2} e} \\
 & \left( \sqrt{a-c-\sqrt{a^2+b^2-2 a c+c^2}} \text{ArcTanh}\left[\left(a-c-\sqrt{a^2+b^2-2 a c+c^2}+b \cot [d+e x]\right)\right] / \right. \\
 & \left. \left( \sqrt{2} \sqrt{a-c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \right) \right) / \\
 & \left( \sqrt{2} \sqrt{a^2+b^2-2 a c+c^2} e \right) + \left( \sqrt{a-c+\sqrt{a^2+b^2-2 a c+c^2}} \right. \\
 & \left. \text{ArcTanh}\left[\left(a-c+\sqrt{a^2+b^2-2 a c+c^2}+b \cot [d+e x]\right)\right] / \right. \\
 & \left. \left( \sqrt{2} \sqrt{a-c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \right) \right) / \\
 & \left( \sqrt{2} \sqrt{a^2+b^2-2 a c+c^2} e \right) - \frac{3 b \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \tan [d+e x]}{4 a^2 e} + \\
 & \frac{\sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \tan [d+e x]^2}{2 a e}
 \end{aligned}$$

Result (type ?, 325525 leaves): Display of huge result suppressed!

**Problem 6: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \cot [d+e x]^5 \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} dx$$

Optimal (type 3, 976 leaves, 21 steps):

$$\begin{aligned}
 & - \left( \left( \sqrt{a^2+b^2+c} \left( c+\sqrt{a^2+b^2-2 a c+c^2} \right) - a \left( 2 c+\sqrt{a^2+b^2-2 a c+c^2} \right) \right) \right. \\
 & \left. \text{ArcTan}\left[\left(b^2+(a-c)\left(a-c-\sqrt{a^2+b^2-2 a c+c^2}\right)-b \sqrt{a^2+b^2-2 a c+c^2} \cot [d+e x]\right)\right] / \right. \\
 & \left( \sqrt{2} \left(a^2+b^2-2 a c+c^2\right)^{1/4} \sqrt{\left(a^2+b^2+c\left(c+\sqrt{a^2+b^2-2 a c+c^2}\right)- \right. \right. \\
 & \left. \left. a\left(2 c+\sqrt{a^2+b^2-2 a c+c^2}\right)\right) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} \right) \right) / \\
 & \left( \sqrt{2} \left(a^2+b^2-2 a c+c^2\right)^{1/4} e \right) - \frac{b \text{ArcTanh}\left[\frac{b+2 c \cot [d+e x]}{2 \sqrt{c} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{2 \sqrt{c} e} +
 \end{aligned}$$

$$\begin{aligned}
 & \frac{b (b^2 - 4 a c) \operatorname{ArcTanh}\left[\frac{b+2 c \cot [d+e x]}{2 \sqrt{c} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{16 c^{5/2} e} - \\
 & \frac{b (7 b^2 - 12 a c) (b^2 - 4 a c) \operatorname{ArcTanh}\left[\frac{b+2 c \cot [d+e x]}{2 \sqrt{c} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{256 c^{9/2} e} + \\
 & \left( \sqrt{\left( a^2 + b^2 + c \left( c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right)} \right. \\
 & \quad \left. \operatorname{ArcTanh}\left[ \left( b^2 + (a - c) \left( a - c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) + b \sqrt{a^2 + b^2 - 2 a c + c^2} \cot [d + e x] \right) \right] \right) / \\
 & \quad \left( \sqrt{2} \left( a^2 + b^2 - 2 a c + c^2 \right)^{1/4} \sqrt{\left( a^2 + b^2 + c \left( c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - \right.} \right. \\
 & \quad \left. \left. a \left( 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right) / \\
 & \quad \left( \sqrt{2} \left( a^2 + b^2 - 2 a c + c^2 \right)^{1/4} e \right) - \frac{\sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}}{e} - \\
 & \frac{b (b + 2 c \cot [d + e x]) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}}{8 c^2 e} + \\
 & \frac{1}{128 c^4 e} \\
 & b \\
 & \frac{(7 b^2 - 12 a c) (b + 2 c \cot [d + e x]) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} + (a + b \cot [d + e x] + c \cot [d + e x]^2)^{3/2}}{3 c e} - \\
 & \frac{\cot [d + e x]^2 (a + b \cot [d + e x] + c \cot [d + e x]^2)^{3/2}}{5 c e} - \\
 & \frac{1}{240 c^3 e} \\
 & (35 b^2 - 32 a c - 42 b c \cot [d + e x]) (a + b \cot [d + e x] + c \cot [d + e x]^2)^{3/2}
 \end{aligned}$$

Result (type 3, 4237 leaves):

$$\begin{aligned}
 & \frac{1}{e} \left( -\frac{105 b^4 + 460 a b^2 c - 256 a^2 c^2 + 296 b^2 c^2 - 768 a c^3 + 2944 c^4}{1920 c^4} + \frac{1}{960 c^3} \right. \\
 & \quad \left. (-35 b^3 \cos [d + e x] + 116 a b c \cos [d + e x] + 104 b c^2 \cos [d + e x]) \operatorname{Csc} [d + e x] + \right. \\
 & \quad \left. \frac{(7 b^2 - 16 a c + 176 c^2) \operatorname{Csc} [d + e x]^2}{240 c^2} - \frac{b \cot [d + e x] \operatorname{Csc} [d + e x]^2}{40 c} - \frac{1}{5} \operatorname{Csc} [d + e x]^4 \right) \\
 & \quad \sqrt{\left( \frac{-a - c + a \cos [2 (d + e x)] - c \cos [2 (d + e x)] - b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right) +}
 \end{aligned}$$

$$\begin{aligned}
 & \left( \left( b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \text{Log}[\text{Tan}[d + e x]] - \right. \right. \\
 & \quad 128 \sqrt{a - i b - c} c^{9/2} \text{Log} \left[ \left( -2 c - 2 i a \text{Tan}[d + e x] - b (i + \text{Tan}[d + e x]) + \right. \right. \\
 & \quad \quad \left. \left. 2 i \sqrt{a - i b - c} \sqrt{c + \text{Tan}[d + e x] (b + a \text{Tan}[d + e x])} \right) \right] / \left( 128 (a - i b - c)^{3/2} \right. \\
 & \quad \quad \left. c^4 (-i + \text{Tan}[d + e x]) \right) \left. \right) - b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \\
 & \quad \text{Log} \left[ 2 c + b \text{Tan}[d + e x] + 2 \sqrt{c} \sqrt{c + \text{Tan}[d + e x] (b + a \text{Tan}[d + e x])} \right] + \\
 & \quad 128 \sqrt{a + i b - c} c^{9/2} \text{Log} \left[ \left( 2 c + b (-i + \text{Tan}[d + e x]) - \right. \right. \\
 & \quad \quad \left. \left. 2 i (a \text{Tan}[d + e x] + \sqrt{a + i b - c} \sqrt{c + \text{Tan}[d + e x] (b + a \text{Tan}[d + e x])}) \right) \right] / \\
 & \quad \left( 128 (a + i b - c)^{3/2} c^4 (i + \text{Tan}[d + e x]) \right) \left. \right) \\
 & \left( \left( 7 b^5 \sqrt{\left( -\frac{a}{-1 + \text{Cos}[2 (d + e x)]} - \frac{c}{-1 + \text{Cos}[2 (d + e x)]} + \frac{a \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \right. \right. \right. \\
 & \quad \left. \left. \frac{c \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \frac{b \text{Sin}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} \right) \right) / \\
 & \quad \left( 128 c^4 (a + c - a \text{Cos}[2 (d + e x)] + c \text{Cos}[2 (d + e x)] + b \text{Sin}[2 (d + e x)]) \right) - \\
 & \left( 5 a b^3 \sqrt{\left( -\frac{a}{-1 + \text{Cos}[2 (d + e x)]} - \frac{c}{-1 + \text{Cos}[2 (d + e x)]} + \frac{a \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \right. \right. \\
 & \quad \left. \left. \frac{c \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \frac{b \text{Sin}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} \right) \right) / \\
 & \quad \left( 16 c^3 (a + c - a \text{Cos}[2 (d + e x)] + c \text{Cos}[2 (d + e x)] + b \text{Sin}[2 (d + e x)]) \right) + \\
 & \left( 3 a^2 b \sqrt{\left( -\frac{a}{-1 + \text{Cos}[2 (d + e x)]} - \frac{c}{-1 + \text{Cos}[2 (d + e x)]} + \frac{a \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \right. \right. \\
 & \quad \left. \left. \frac{c \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \frac{b \text{Sin}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} \right) \right) / \\
 & \quad \left( 8 c^2 (a + c - a \text{Cos}[2 (d + e x)] + c \text{Cos}[2 (d + e x)] + b \text{Sin}[2 (d + e x)]) \right) - \\
 & \left( b^3 \sqrt{\left( -\frac{a}{-1 + \text{Cos}[2 (d + e x)]} - \frac{c}{-1 + \text{Cos}[2 (d + e x)]} + \frac{a \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \right. \right. \\
 & \quad \left. \left. \frac{c \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \frac{b \text{Sin}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} \right) \right) / \\
 & \quad \left( 8 c^2 (a + c - a \text{Cos}[2 (d + e x)] + c \text{Cos}[2 (d + e x)] + b \text{Sin}[2 (d + e x)]) \right) + \\
 & \left( a b \sqrt{\left( -\frac{a}{-1 + \text{Cos}[2 (d + e x)]} - \frac{c}{-1 + \text{Cos}[2 (d + e x)]} + \frac{a \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \right. \right. \\
 & \quad \left. \left. \frac{c \text{Cos}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} - \frac{b \text{Sin}[2 (d + e x)]}{-1 + \text{Cos}[2 (d + e x)]} \right) \right) / \\
 & \quad \left( 2 c (a + c - a \text{Cos}[2 (d + e x)] + c \text{Cos}[2 (d + e x)] + b \text{Sin}[2 (d + e x)]) \right) +
 \end{aligned}$$

$$\begin{aligned}
 & \left( b \cos[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right.} \right. \\
 & \quad \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right)} \right) / \\
 & \quad (a+c-a \cos[2(d+ex)]+c \cos[2(d+ex)]+b \sin[2(d+ex)]) + \\
 & \left( a \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right.} \right. \\
 & \quad \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right)} \right) / \\
 & \quad (a+c-a \cos[2(d+ex)]+c \cos[2(d+ex)]+b \sin[2(d+ex)]) - \\
 & \left( c \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right.} \right. \\
 & \quad \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right)} \right) / \\
 & \quad (a+c-a \cos[2(d+ex)]+c \cos[2(d+ex)]+b \sin[2(d+ex)]) \Big) \\
 & \tan[d+ex] \sqrt{a+\cot[d+ex]^2(c+b \tan[d+ex])} \Big) / \left( 256 \right. \\
 & c^{9/2} \\
 & e \\
 & \left. \sqrt{c+\tan[d+ex](b+a \tan[d+ex])} \right. \\
 & \left. \left( -\frac{1}{512 c^{9/2}(c+\tan[d+ex](b+a \tan[d+ex]))^{3/2}} \right. \right. \\
 & \quad \left. \left( b(7b^4-8b^2c(5a+2c))+16c^2(3a^2+4ac+8c^2) \right) \log[\tan[d+ex]] - \right. \\
 & \quad 128 \sqrt{a-ib-c} c^{9/2} \log\left[ \left( -2c-2ia \tan[d+ex]-b(i+\tan[d+ex])+ \right. \right. \\
 & \quad \left. \left. 2i \sqrt{a-ib-c} \sqrt{c+\tan[d+ex](b+a \tan[d+ex])} \right) \right] / \left( 128(a-ib-c)^{3/2} \right. \\
 & \quad \left. c^4(-i+\tan[d+ex]) \right) \Big] - b(7b^4-8b^2c(5a+2c))+16c^2(3a^2+4ac+8c^2) \\
 & \quad \log[2c+b \tan[d+ex]+2\sqrt{c} \sqrt{c+\tan[d+ex](b+a \tan[d+ex])}] + \\
 & \quad 128 \sqrt{a+ib-c} c^{9/2} \log\left[ \left( 2c+b(-i+\tan[d+ex])- \right. \right. \\
 & \quad \left. \left. 2i \left( a \tan[d+ex]+\sqrt{a+ib-c} \sqrt{c+\tan[d+ex](b+a \tan[d+ex])} \right) \right) \right] / \\
 & \quad \left( 128(a+ib-c)^{3/2} c^4(i+\tan[d+ex]) \right) \Big] \tan[d+ex] \\
 & \quad (a \sec[d+ex]^2 \tan[d+ex]+ \sec[d+ex]^2(b+a \tan[d+ex])) \\
 & \quad \sqrt{a+\cot[d+ex]^2(c+b \tan[d+ex])} + \frac{1}{256 c^{9/2} \sqrt{c+\tan[d+ex](b+a \tan[d+ex])}}
 \end{aligned}$$

$$\begin{aligned}
 & \left( b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \operatorname{Log}[\operatorname{Tan}[d + e x]] - \right. \\
 & 128 \sqrt{a - i b - c} c^{9/2} \operatorname{Log}\left[\left(-2 c - 2 i a \operatorname{Tan}[d + e x] - b (i + \operatorname{Tan}[d + e x]) + 2 i \right. \right. \\
 & \left. \left. \sqrt{a - i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}\right)\right] / \left(128 (a - i b - c)^{3/2} c^4 \right. \\
 & \left. (-i + \operatorname{Tan}[d + e x])\right) - b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \\
 & \operatorname{Log}\left[2 c + b \operatorname{Tan}[d + e x] + 2 \sqrt{c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}\right] + \\
 & 128 \sqrt{a + i b - c} c^{9/2} \operatorname{Log}\left[\left(2 c + b (-i + \operatorname{Tan}[d + e x]) - 2 i (a \operatorname{Tan}[d + e x] + \right. \right. \\
 & \left. \left. \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}\right)\right) / \left(128 (a + i b - c)^{3/2} c^4 \right. \\
 & \left. (i + \operatorname{Tan}[d + e x])\right) \left. \right) \operatorname{Sec}[d + e x]^2 \sqrt{a + \operatorname{Cot}[d + e x]^2 (c + b \operatorname{Tan}[d + e x])} + \\
 & \left( \left( b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \operatorname{Log}[\operatorname{Tan}[d + e x]] - \right. \right. \\
 & 128 \sqrt{a - i b - c} c^{9/2} \operatorname{Log}\left[\left(-2 c - 2 i a \operatorname{Tan}[d + e x] - b (i + \operatorname{Tan}[d + e x]) + \right. \right. \\
 & \left. \left. 2 i \sqrt{a - i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}\right)\right] / \left(128 (a - i b - c)^{3/2} \right. \\
 & \left. c^4 (-i + \operatorname{Tan}[d + e x])\right) - b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \\
 & \operatorname{Log}\left[2 c + b \operatorname{Tan}[d + e x] + 2 \sqrt{c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}\right] + \\
 & 128 \sqrt{a + i b - c} c^{9/2} \operatorname{Log}\left[\left(2 c + b (-i + \operatorname{Tan}[d + e x]) - \right. \right. \\
 & \left. \left. 2 i (a \operatorname{Tan}[d + e x] + \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}\right)\right) / \left. \right. \\
 & \left. \left. (128 (a + i b - c)^{3/2} c^4 (i + \operatorname{Tan}[d + e x])\right) \right] \operatorname{Tan}[d + e x] \\
 & \left. \left. (b \operatorname{Csc}[d + e x]^2 - 2 \operatorname{Cot}[d + e x] \operatorname{Csc}[d + e x]^2 (c + b \operatorname{Tan}[d + e x]))\right) / \right. \\
 & \left. \left. \left(512 c^{9/2} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \sqrt{a + \operatorname{Cot}[d + e x]^2 (c + b \operatorname{Tan}[d + e x])}\right) + \right. \right. \\
 & \left. \left. \frac{1}{256 c^{9/2} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}} \right. \right. \\
 & \left. \left. \operatorname{Tan}[d + e x] \sqrt{a + \operatorname{Cot}[d + e x]^2 (c + b \operatorname{Tan}[d + e x])} \right. \right. \\
 & \left. \left. \left( b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \operatorname{Csc}[d + e x] \operatorname{Sec}[d + e x] - \right. \right. \right. \\
 & \left. \left. \left( b (7 b^4 - 8 b^2 c (5 a + 2 c) + 16 c^2 (3 a^2 + 4 a c + 8 c^2)) \left( b \operatorname{Sec}[d + e x]^2 + \right. \right. \right. \right. \\
 & \left. \left. \left. \left( \sqrt{c} (a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2 (b + a \operatorname{Tan}[d + e x])) \right) \right) \right) / \right. \right. \\
 & \left. \left. \left( \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \right) / \right. \\
 & \left. \left. \left( 2 c + b \operatorname{Tan}[d + e x] + 2 \sqrt{c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) - \right. \right. \\
 & \left. \left. \left( 16384 (a - i b - c)^2 c^{17/2} (-i + \operatorname{Tan}[d + e x]) \left( (-2 i a \operatorname{Sec}[d + e x]^2 - \right. \right. \right. \right. \\
 & \left. \left. \left. b \operatorname{Sec}[d + e x]^2 + (i \sqrt{a - i b - c} (a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2) \right) \right) \right) \right. \right.
 \end{aligned}$$



$$\begin{aligned}
 & \left( (b + a \operatorname{Tan}[d + e x]) \right) \Big/ \left( \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big/ \\
 & \left( 128 (a - i b - c)^{3/2} c^4 (-i + \operatorname{Tan}[d + e x]) \right) - \left( \operatorname{Sec}[d + e x]^2 \right. \\
 & \left. (-2c - 2i a \operatorname{Tan}[d + e x] - b (i + \operatorname{Tan}[d + e x]) + 2i \sqrt{a - i b - c} \right. \\
 & \left. \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big/ \left( 128 (a - i b - c)^{3/2} c^4 \right. \\
 & \left. (-i + \operatorname{Tan}[d + e x])^2 \right) \Big/ \left( -2c - 2i a \operatorname{Tan}[d + e x] - b (i + \operatorname{Tan}[d + e x]) + \right. \\
 & \left. 2i \sqrt{a - i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) + \left( 16384 (a + i b - c)^2 \right. \\
 & \left. c^{17/2} (i + \operatorname{Tan}[d + e x]) \left( \left( b \operatorname{Sec}[d + e x]^2 - 2i (a \operatorname{Sec}[d + e x]^2 + \left( \sqrt{a + i b - c} \right. \right. \right. \right. \right. \\
 & \left. \left. \left( a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2 (b + a \operatorname{Tan}[d + e x]) \right) \right) \right) \Big/ \right. \\
 & \left. \left( 2 \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \Big/ \left( 128 (a + i b - c)^{3/2} \right. \\
 & \left. c^4 (i + \operatorname{Tan}[d + e x]) \right) - \left( \operatorname{Sec}[d + e x]^2 (2c + b (-i + \operatorname{Tan}[d + e x]) - \right. \\
 & \left. 2i (a \operatorname{Tan}[d + e x] + \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}) \right) \Big/ \\
 & \left( 128 (a + i b - c)^{3/2} c^4 (i + \operatorname{Tan}[d + e x])^2 \right) \Big/ \left( 2c + b (-i + \operatorname{Tan}[d + e x]) - \right. \\
 & \left. 2i (a \operatorname{Tan}[d + e x] + \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}) \right) \Big/ \Big) \Big) \Big) \Big) \Big)
 \end{aligned}$$

**Problem 7: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \operatorname{Cot}[d + e x]^3 \sqrt{a + b \operatorname{Cot}[d + e x] + c \operatorname{Cot}[d + e x]^2} dx$$

Optimal (type 3, 747 leaves, 16 steps):

$$\left( \sqrt{\left( a^2 + b^2 + c \left( c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right)} \right. \\ \left. \text{ArcTan} \left[ \left( b^2 + (a - c) \left( a - c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - b \sqrt{a^2 + b^2 - 2 a c + c^2} \cot [d + e x] \right) / \right. \right. \\ \left. \left. \left( \sqrt{2} \left( a^2 + b^2 - 2 a c + c^2 \right)^{1/4} \sqrt{\left( a^2 + b^2 + c \left( c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right)} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right) \right] \right) / \\ \left( \sqrt{2} \left( a^2 + b^2 - 2 a c + c^2 \right)^{1/4} e \right) + \frac{b \text{ArcTanh} \left[ \frac{b + 2 c \cot [d + e x]}{2 \sqrt{c} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}} \right]}{2 \sqrt{c} e} - \\ \frac{b \left( b^2 - 4 a c \right) \text{ArcTanh} \left[ \frac{b + 2 c \cot [d + e x]}{2 \sqrt{c} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}} \right]}{16 c^{5/2} e} - \\ \left( \sqrt{\left( a^2 + b^2 + c \left( c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right)} \right. \\ \left. \text{ArcTanh} \left[ \left( b^2 + (a - c) \left( a - c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) + b \sqrt{a^2 + b^2 - 2 a c + c^2} \cot [d + e x] \right) / \right. \right. \\ \left. \left. \left( \sqrt{2} \left( a^2 + b^2 - 2 a c + c^2 \right)^{1/4} \sqrt{\left( a^2 + b^2 + c \left( c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right)} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right) \right] \right) / \\ \left( \sqrt{2} \left( a^2 + b^2 - 2 a c + c^2 \right)^{1/4} e \right) + \frac{\sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}}{e} + \\ \frac{b \left( b + 2 c \cot [d + e x] \right) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}}{8 c^2 e} - \\ \frac{\left( a + b \cot [d + e x] + c \cot [d + e x]^2 \right)^{3/2}}{3 c e}$$

Result (type 3, 3416 leaves):

$$\frac{1}{e} \left( \frac{3 b^2 - 8 a c + 32 c^2}{24 c^2} - \frac{b \cot [d + e x]}{12 c} - \frac{1}{3} \text{Csc} [d + e x]^2 \right) \\ \sqrt{\left( \frac{-a - c + a \cos [2 (d + e x)] - c \cos [2 (d + e x)] - b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right) +} \\ \left( \left( b \left( b^2 - 4 c \left( a + 2 c \right) \right) \log [\tan [d + e x]] - 8 \sqrt{a + i b - c} c^{5/2} \log \left[ \left( i \left( b + 2 i c + 2 a \tan [d + e x] + \right. \right. \right. \right. \right. \\ \left. \left. \left. i b \tan [d + e x] + 2 \sqrt{a + i b - c} \sqrt{c + \tan [d + e x] \left( b + a \tan [d + e x] \right)} \right) \right] \right) \right) / \\ \left( 8 \left( a + i b - c \right)^{3/2} c^2 \left( i + \tan [d + e x] \right) \right) - b \left( b^2 - 4 c \left( a + 2 c \right) \right) \\ \log \left[ 2 c + b \tan [d + e x] + 2 \sqrt{c} \sqrt{c + \tan [d + e x] \left( b + a \tan [d + e x] \right)} \right] + \\ 8 \sqrt{a - i b - c} c^{5/2} \log \left[ \left( b \left( i + \tan [d + e x] \right) + \right. \right.$$

$$\begin{aligned}
 & 2 \left( c + i a \tan [d + e x] - i \sqrt{a - i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \Big/ \\
 & \left( 8 (a - i b - c)^{3/2} c^2 (-i + \tan [d + e x]) \right) \Big] \\
 & \left( \left( b^3 \sqrt{\left( -\frac{a}{-1 + \cos [2 (d + e x)]} - \frac{c}{-1 + \cos [2 (d + e x)]} + \frac{a \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{c \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right)} \right) \Big/ \right. \\
 & \left. \left( 8 c^2 (a + c - a \cos [2 (d + e x)] + c \cos [2 (d + e x)] + b \sin [2 (d + e x)]) \right) - \right. \\
 & \left( a b \sqrt{\left( -\frac{a}{-1 + \cos [2 (d + e x)]} - \frac{c}{-1 + \cos [2 (d + e x)]} + \frac{a \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{c \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right)} \right) \Big/ \\
 & \left. \left( 2 c (a + c - a \cos [2 (d + e x)] + c \cos [2 (d + e x)] + b \sin [2 (d + e x)]) \right) \right) - \\
 & \left( b \cos [2 (d + e x)] \sqrt{\left( -\frac{a}{-1 + \cos [2 (d + e x)]} - \frac{c}{-1 + \cos [2 (d + e x)]} + \frac{a \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{c \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right)} \right) \Big/ \\
 & \left( a + c - a \cos [2 (d + e x)] + c \cos [2 (d + e x)] + b \sin [2 (d + e x)] \right) - \\
 & \left( a \sin [2 (d + e x)] \sqrt{\left( -\frac{a}{-1 + \cos [2 (d + e x)]} - \frac{c}{-1 + \cos [2 (d + e x)]} + \frac{a \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{c \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right)} \right) \Big/ \\
 & \left( a + c - a \cos [2 (d + e x)] + c \cos [2 (d + e x)] + b \sin [2 (d + e x)] \right) + \\
 & \left( c \sin [2 (d + e x)] \sqrt{\left( -\frac{a}{-1 + \cos [2 (d + e x)]} - \frac{c}{-1 + \cos [2 (d + e x)]} + \frac{a \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{c \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right)} \right) \Big/ \\
 & \left( a + c - a \cos [2 (d + e x)] + c \cos [2 (d + e x)] + b \sin [2 (d + e x)] \right) \Big]
 \end{aligned}$$

$$\tan [d + e x] \sqrt{a + \cot [d + e x]^2 (c + b \tan [d + e x])} \Big/ \left( 16$$

 $c^{5/2}$ 
 $e$ 

$$\sqrt{c + \tan [d + e x] (b + a \tan [d + e x])}$$

$$\left( -\frac{1}{32 c^{5/2} (c + \tan [d + e x] (b + a \tan [d + e x]))^{3/2}} \left( b (b^2 - 4 c (a + 2 c)) \log [\tan [d + e x]] - \right. \right.$$

$$\begin{aligned}
 & 8 \sqrt{a+i b-c} c^{5/2} \text{Log} \left[ \left( i \left( b+2 i c+2 a \text{Tan}[d+e x]+i b \text{Tan}[d+e x]+ \right. \right. \right. \\
 & \quad \left. \left. \left. 2 \sqrt{a+i b-c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right) \right) \right] / \\
 & \quad \left( 8 (a+i b-c)^{3/2} c^2 (i+\text{Tan}[d+e x]) \right) - b (b^2-4 c (a+2 c)) \\
 & \quad \text{Log} \left[ 2 c+b \text{Tan}[d+e x]+2 \sqrt{c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right] + \\
 & 8 \sqrt{a-i b-c} c^{5/2} \text{Log} \left[ \left( b (i+\text{Tan}[d+e x]) + \right. \right. \\
 & \quad \left. \left. 2 \left( c+i a \text{Tan}[d+e x]-i \sqrt{a-i b-c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right) \right) \right] / \\
 & \quad \left( 8 (a-i b-c)^{3/2} c^2 (-i+\text{Tan}[d+e x]) \right) \text{Tan}[d+e x] \\
 & \quad \left( a \text{Sec}[d+e x]^2 \text{Tan}[d+e x]+\text{Sec}[d+e x]^2 (b+a \text{Tan}[d+e x]) \right) \\
 & \quad \sqrt{a+\text{Cot}[d+e x]^2 (c+b \text{Tan}[d+e x])} + \\
 & \quad \frac{1}{16 c^{5/2} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])}} \left( b (b^2-4 c (a+2 c)) \text{Log}[\text{Tan}[d+e x]] - \right. \\
 & 8 \sqrt{a+i b-c} c^{5/2} \text{Log} \left[ \left( i \left( b+2 i c+2 a \text{Tan}[d+e x]+i b \text{Tan}[d+e x]+ \right. \right. \right. \\
 & \quad \left. \left. \left. 2 \sqrt{a+i b-c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right) \right) \right] / \\
 & \quad \left( 8 (a+i b-c)^{3/2} c^2 (i+\text{Tan}[d+e x]) \right) - b (b^2-4 c (a+2 c)) \\
 & \quad \text{Log} \left[ 2 c+b \text{Tan}[d+e x]+2 \sqrt{c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right] + \\
 & 8 \sqrt{a-i b-c} c^{5/2} \text{Log} \left[ \left( b (i+\text{Tan}[d+e x]) + 2 \left( c+i a \text{Tan}[d+e x]- \right. \right. \right. \\
 & \quad \left. \left. \left. i \sqrt{a-i b-c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right) \right) \right] / \\
 & \quad \left( 8 (a-i b-c)^{3/2} c^2 (-i+\text{Tan}[d+e x]) \right) \text{Sec}[d+e x]^2 \\
 & \quad \sqrt{a+\text{Cot}[d+e x]^2 (c+b \text{Tan}[d+e x])} + \left( \left( b (b^2-4 c (a+2 c)) \text{Log}[\text{Tan}[d+e x]] - \right. \right. \\
 & 8 \sqrt{a+i b-c} c^{5/2} \text{Log} \left[ \left( i \left( b+2 i c+2 a \text{Tan}[d+e x]+i b \text{Tan}[d+e x]+ \right. \right. \right. \\
 & \quad \left. \left. \left. 2 \sqrt{a+i b-c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right) \right) \right] / \\
 & \quad \left( 8 (a+i b-c)^{3/2} c^2 (i+\text{Tan}[d+e x]) \right) - b (b^2-4 c (a+2 c)) \\
 & \quad \text{Log} \left[ 2 c+b \text{Tan}[d+e x]+2 \sqrt{c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right] + \\
 & 8 \sqrt{a-i b-c} c^{5/2} \text{Log} \left[ \left( b (i+\text{Tan}[d+e x]) + \right. \right. \\
 & \quad \left. \left. 2 \left( c+i a \text{Tan}[d+e x]-i \sqrt{a-i b-c} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \right) \right) \right] / \\
 & \quad \left( 8 (a-i b-c)^{3/2} c^2 (-i+\text{Tan}[d+e x]) \right) \text{Tan}[d+e x] \\
 & \quad \left( b \text{Csc}[d+e x]^2-2 \text{Cot}[d+e x] \text{Csc}[d+e x]^2 (c+b \text{Tan}[d+e x]) \right) \right] / \\
 & \quad \left( 32 c^{5/2} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])} \sqrt{a+\text{Cot}[d+e x]^2 (c+b \text{Tan}[d+e x])} \right) + \\
 & \quad \frac{1}{16 c^{5/2} \sqrt{c+\text{Tan}[d+e x] (b+a \text{Tan}[d+e x])}}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Tan}[d+ex] \sqrt{a + \text{Cot}[d+ex]^2 (c + b \text{Tan}[d+ex])} \\
 & \left( b (b^2 - 4c (a + 2c)) \text{Csc}[d+ex] \text{Sec}[d+ex] - \right. \\
 & \left. \left( b (b^2 - 4c (a + 2c)) \left( b \text{Sec}[d+ex]^2 + \left( \sqrt{c} (a \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + \text{Sec}[d+ex]^2 \right. \right. \right. \right. \\
 & \left. \left. \left. (b + a \text{Tan}[d+ex]) \right) \right) \right) \right) / \left( \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) \Bigg) / \\
 & \left( 2c + b \text{Tan}[d+ex] + 2 \sqrt{c} \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) + \left( 64 i (a + i b - c)^2 \right. \\
 & \left. c^{9/2} (i + \text{Tan}[d+ex]) \left( \left( i \left( 2a \text{Sec}[d+ex]^2 + i b \text{Sec}[d+ex]^2 + \left( \sqrt{a + i b - c} \right. \right. \right. \right. \right. \right. \\
 & \left. \left. \left. (a \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + \text{Sec}[d+ex]^2 (b + a \text{Tan}[d+ex]) \right) \right) \right) \right) / \\
 & \left( \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) \Bigg) / \left( 8 (a + i b - c)^{3/2} \right. \\
 & \left. c^2 (i + \text{Tan}[d+ex]) \right) - \left( i \text{Sec}[d+ex]^2 \left( b + 2 i c + 2 a \text{Tan}[d+ex] + \right. \right. \\
 & \left. \left. i b \text{Tan}[d+ex] + 2 \sqrt{a + i b - c} \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) \right) \Bigg) / \\
 & \left( 8 (a + i b - c)^{3/2} c^2 (i + \text{Tan}[d+ex])^2 \right) \Bigg) / \left( b + 2 i c + 2 a \text{Tan}[d+ex] + i b \text{Tan}[d+ex] \right. \\
 & \left. + 2 \sqrt{a + i b - c} \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) + \left( 64 (a - i b - c)^2 \right. \\
 & \left. c^{9/2} (-i + \text{Tan}[d+ex]) \left( \left( b \text{Sec}[d+ex]^2 + 2 \left( i a \text{Sec}[d+ex]^2 - \left( i \sqrt{a - i b - c} \right. \right. \right. \right. \right. \right. \\
 & \left. \left. \left. (a \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + \text{Sec}[d+ex]^2 (b + a \text{Tan}[d+ex]) \right) \right) \right) \right) / \\
 & \left( 2 \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) \Bigg) / \left( 8 (a - i b - c)^{3/2} c^2 \right. \\
 & \left. (-i + \text{Tan}[d+ex]) \right) - \left( \text{Sec}[d+ex]^2 \left( b (i + \text{Tan}[d+ex]) + 2 (c + i a \right. \right. \\
 & \left. \left. \text{Tan}[d+ex] - i \sqrt{a - i b - c} \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) \right) \Bigg) \Bigg) / \\
 & \left( 8 (a - i b - c)^{3/2} c^2 (-i + \text{Tan}[d+ex])^2 \right) \Bigg) / \left( b (i + \text{Tan}[d+ex]) + \right. \\
 & \left. 2 (c + i a \text{Tan}[d+ex] - i \sqrt{a - i b - c} \sqrt{c + \text{Tan}[d+ex] (b + a \text{Tan}[d+ex])} \right) \Bigg) \Bigg) \Bigg)
 \end{aligned}$$

**Problem 8: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \text{Cot}[d+ex] \sqrt{a + b \text{Cot}[d+ex] + c \text{Cot}[d+ex]^2} dx$$

Optimal (type 3, 602 leaves, 10 steps):

$$\begin{aligned}
 & - \left( \left( \sqrt{a^2 + b^2 + c \left( c + \sqrt{a^2 + b^2 - 2ac + c^2} \right)} - a \left( 2c + \sqrt{a^2 + b^2 - 2ac + c^2} \right) \right) \right. \\
 & \quad \left. \text{ArcTan} \left[ \left( b^2 + (a - c) \left( a - c - \sqrt{a^2 + b^2 - 2ac + c^2} \right) - b \sqrt{a^2 + b^2 - 2ac + c^2} \cot [d + ex] \right) / \right. \right. \\
 & \quad \left. \left( \sqrt{2} \left( a^2 + b^2 - 2ac + c^2 \right)^{1/4} \sqrt{a^2 + b^2 + c \left( c + \sqrt{a^2 + b^2 - 2ac + c^2} \right)} - \right. \right. \\
 & \quad \left. \left. a \left( 2c + \sqrt{a^2 + b^2 - 2ac + c^2} \right) \sqrt{a + b \cot [d + ex] + c \cot [d + ex]^2} \right) \right] \right) / \\
 & \quad \left( \sqrt{2} \left( a^2 + b^2 - 2ac + c^2 \right)^{1/4} e \right) - \frac{b \text{ArcTanh} \left[ \frac{b + 2c \cot [d + ex]}{2\sqrt{c} \sqrt{a + b \cot [d + ex] + c \cot [d + ex]^2}} \right]}{2\sqrt{c} e} + \\
 & \left( \sqrt{a^2 + b^2 + c \left( c - \sqrt{a^2 + b^2 - 2ac + c^2} \right)} - a \left( 2c - \sqrt{a^2 + b^2 - 2ac + c^2} \right) \right) \\
 & \quad \text{ArcTanh} \left[ \left( b^2 + (a - c) \left( a - c + \sqrt{a^2 + b^2 - 2ac + c^2} \right) + b \sqrt{a^2 + b^2 - 2ac + c^2} \cot [d + ex] \right) / \right. \\
 & \quad \left. \left( \sqrt{2} \left( a^2 + b^2 - 2ac + c^2 \right)^{1/4} \sqrt{a^2 + b^2 + c \left( c - \sqrt{a^2 + b^2 - 2ac + c^2} \right)} - \right. \right. \\
 & \quad \left. \left. a \left( 2c - \sqrt{a^2 + b^2 - 2ac + c^2} \right) \sqrt{a + b \cot [d + ex] + c \cot [d + ex]^2} \right) \right] \right) / \\
 & \quad \left( \sqrt{2} \left( a^2 + b^2 - 2ac + c^2 \right)^{1/4} e \right) - \frac{\sqrt{a + b \cot [d + ex] + c \cot [d + ex]^2}}{e}
 \end{aligned}$$

Result (type 3, 2871 leaves):

$$\begin{aligned}
 & - \frac{\sqrt{\frac{-a - c + a \cos [2 (d + ex)] - c \cos [2 (d + ex)] - b \sin [2 (d + ex)]}{-1 + \cos [2 (d + ex)]}}}{e} - \left( \left( - \frac{b \log [\tan [d + ex]]}{\sqrt{c}} - \right. \right. \\
 & \quad \left. \left. \sqrt{a + ib - c} \log \left[ \left( ib + 2ic + 2a \tan [d + ex] + ib \tan [d + ex] + 2\sqrt{a + ib - c} \sqrt{c + \tan [d + ex] (b + a \tan [d + ex])} \right) / \left( (a + ib - c)^{3/2} (i + \tan [d + ex]) \right) \right] \right) + \\
 & \quad \frac{1}{\sqrt{c}} b \log [2c + b \tan [d + ex] + 2\sqrt{c} \sqrt{c + \tan [d + ex] (b + a \tan [d + ex])}] + \\
 & \quad \left. \sqrt{a - ib - c} \log \left[ \left( b (i + \tan [d + ex]) + 2(c + ia \tan [d + ex] - i\sqrt{a - ib - c} \sqrt{c + \tan [d + ex] (b + a \tan [d + ex])} \right) / \left( (a - ib - c)^{3/2} (-i + \tan [d + ex]) \right) \right] \right) \\
 & \left( - \left( \left( b \cos [2 (d + ex)] \sqrt{\left( - \frac{a}{-1 + \cos [2 (d + ex)]} - \frac{c}{-1 + \cos [2 (d + ex)]} + \right. \right. \right. \right. \\
 & \quad \left. \left. \frac{a \cos [2 (d + ex)]}{-1 + \cos [2 (d + ex)]} - \frac{c \cos [2 (d + ex)]}{-1 + \cos [2 (d + ex)]} - \frac{b \sin [2 (d + ex)]}{-1 + \cos [2 (d + ex)]} \right) \right) / \\
 & \quad \left. \left. \left. \left. (-a - c + a \cos [2 (d + ex)] - c \cos [2 (d + ex)] - b \sin [2 (d + ex)]) \right) \right) - \right.
 \end{aligned}$$

$$\left( a \sin [2 (d+e x)] \sqrt{\left( -\frac{a}{-1+\cos [2 (d+e x)]} - \frac{c}{-1+\cos [2 (d+e x)]} + \frac{a \cos [2 (d+e x)]}{-1+\cos [2 (d+e x)]} - \frac{c \cos [2 (d+e x)]}{-1+\cos [2 (d+e x)]} - \frac{b \sin [2 (d+e x)]}{-1+\cos [2 (d+e x)]} \right)} + \right. \\ \left. (-a-c+a \cos [2 (d+e x)] - c \cos [2 (d+e x)] - b \sin [2 (d+e x)]) + \right. \\ \left. \left( c \sin [2 (d+e x)] \sqrt{\left( -\frac{a}{-1+\cos [2 (d+e x)]} - \frac{c}{-1+\cos [2 (d+e x)]} + \frac{a \cos [2 (d+e x)]}{-1+\cos [2 (d+e x)]} - \frac{c \cos [2 (d+e x)]}{-1+\cos [2 (d+e x)]} - \frac{b \sin [2 (d+e x)]}{-1+\cos [2 (d+e x)]} \right)} + \right. \\ \left. (-a-c+a \cos [2 (d+e x)] - c \cos [2 (d+e x)] - b \sin [2 (d+e x)]) \right) \\ \tan [d+e x] \sqrt{a+\cot [d+e x]^2 (c+b \tan [d+e x])} \Big) / \left( 2 \right. \\ \left. e \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right. \\ \left. \left( \frac{1}{4 (c+\tan [d+e x] (b+a \tan [d+e x]))^{3/2}} \right. \right. \\ \left. \left( -\frac{b \log [\tan [d+e x]]}{\sqrt{c}} - \sqrt{a+i b-c} \log \left[ \left( i (b+2 i c+2 a \tan [d+e x] + \right. \right. \right. \right. \\ \left. \left. \left. i b \tan [d+e x] + 2 \sqrt{a+i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right] \right) \Big) / \right. \\ \left. \left( (a+i b-c)^{3/2} (i+\tan [d+e x]) \right) \right) + \frac{1}{\sqrt{c}} b \log [2 c+b \tan [d+e x] + 2 \sqrt{c} \\ \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])}] + \sqrt{a-i b-c} \log \left[ \left( b (i+\tan [d+e x]) + 2 \right. \right. \\ \left. \left. (c+i a \tan [d+e x] - i \sqrt{a-i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right] \Big) / \right. \\ \left. \left( (a-i b-c)^{3/2} (-i+\tan [d+e x]) \right) \right) \Big) \tan [d+e x] \\ (a \sec [d+e x]^2 \tan [d+e x] + \sec [d+e x]^2 (b+a \tan [d+e x])) \\ \sqrt{a+\cot [d+e x]^2 (c+b \tan [d+e x])} - \frac{1}{2 \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])}} \\ \left( -\frac{b \log [\tan [d+e x]]}{\sqrt{c}} - \sqrt{a+i b-c} \log \left[ \left( i (b+2 i c+2 a \tan [d+e x] + \right. \right. \right. \right. \\ \left. \left. \left. i b \tan [d+e x] + 2 \sqrt{a+i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right] \right) \Big) / \right. \\ \left. \left( (a+i b-c)^{3/2} (i+\tan [d+e x]) \right) \right) + \frac{1}{\sqrt{c}} \\ b \log [2 c+b \tan [d+e x] + 2 \sqrt{c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])}] +$$

$$\begin{aligned}
 & \sqrt{a - i b - c} \operatorname{Log} \left[ \left( b (i + \operatorname{Tan}[d + e x]) + 2 (c + i a \operatorname{Tan}[d + e x] - \right. \right. \\
 & \quad \left. \left. i \sqrt{a - i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \Big/ \left( (a - i b - c)^{3/2} \right. \\
 & \quad \left. (-i + \operatorname{Tan}[d + e x]) \right) \Big] \operatorname{Sec}[d + e x]^2 \sqrt{a + \operatorname{Cot}[d + e x]^2 (c + b \operatorname{Tan}[d + e x])} - \\
 & \left( \left( -\frac{b \operatorname{Log}[\operatorname{Tan}[d + e x]]}{\sqrt{c}} - \sqrt{a + i b - c} \operatorname{Log} \left[ i (b + 2 i c + 2 a \operatorname{Tan}[d + e x] + \right. \right. \right. \\
 & \quad \left. \left. i b \operatorname{Tan}[d + e x] + 2 \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \Big/ \right. \\
 & \quad \left. \left( (a + i b - c)^{3/2} (i + \operatorname{Tan}[d + e x]) \right) \right) \Big] + \frac{1}{\sqrt{c}} b \operatorname{Log} [2 c + b \operatorname{Tan}[d + e x] + 2 \sqrt{c} \\
 & \quad \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}] + \sqrt{a - i b - c} \operatorname{Log} \left[ \left( b (i + \operatorname{Tan}[d + e x]) + \right. \right. \\
 & \quad \left. \left. 2 (c + i a \operatorname{Tan}[d + e x] - i \sqrt{a - i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \Big/ \right. \\
 & \quad \left. \left( (a - i b - c)^{3/2} (-i + \operatorname{Tan}[d + e x]) \right) \right) \Big] \operatorname{Tan}[d + e x] \\
 & \quad \left( b \operatorname{Csc}[d + e x]^2 - 2 \operatorname{Cot}[d + e x] \operatorname{Csc}[d + e x]^2 (c + b \operatorname{Tan}[d + e x]) \right) \Big/ \\
 & \quad \left( 4 \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \sqrt{a + \operatorname{Cot}[d + e x]^2 (c + b \operatorname{Tan}[d + e x])} \right) - \\
 & \quad \frac{1}{2 \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])}} \\
 & \quad \operatorname{Tan}[d + e x] \sqrt{a + \operatorname{Cot}[d + e x]^2 (c + b \operatorname{Tan}[d + e x])} \left( -\frac{b \operatorname{Csc}[d + e x] \operatorname{Sec}[d + e x]}{\sqrt{c}} + \right. \\
 & \quad \left. \left( b (b \operatorname{Sec}[d + e x]^2 + (\sqrt{c} (a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2 \right. \right. \right. \\
 & \quad \left. \left. (b + a \operatorname{Tan}[d + e x]))) \right) \Big/ \left( \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \Big/ \\
 & \quad \left( \sqrt{c} (2 c + b \operatorname{Tan}[d + e x] + 2 \sqrt{c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big) + \\
 & \quad \left( i (a + i b - c)^2 (i + \operatorname{Tan}[d + e x]) \left( \left( i (2 a \operatorname{Sec}[d + e x]^2 + i b \operatorname{Sec}[d + e x]^2 + \right. \right. \right. \\
 & \quad \left. \left. (\sqrt{a + i b - c} (a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2 \right. \right. \right. \\
 & \quad \left. \left. (b + a \operatorname{Tan}[d + e x])) \right) \Big/ \left( \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \right) \right) \Big/ \\
 & \quad \left( (a + i b - c)^{3/2} (i + \operatorname{Tan}[d + e x]) \right) - \left( i \operatorname{Sec}[d + e x]^2 (b + 2 i c + 2 a \operatorname{Tan}[d + e x] + \right. \\
 & \quad \left. i b \operatorname{Tan}[d + e x] + 2 \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big/ \\
 & \quad \left( (a + i b - c)^{3/2} (i + \operatorname{Tan}[d + e x])^2 \right) \Big/ \left( b + 2 i c + 2 a \operatorname{Tan}[d + e x] + i b \right. \\
 & \quad \left. \operatorname{Tan}[d + e x] + 2 \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) + \left( (a - i b - c)^2 \right. \\
 & \quad \left. (-i + \operatorname{Tan}[d + e x]) \left( \left( b \operatorname{Sec}[d + e x]^2 + 2 (i a \operatorname{Sec}[d + e x]^2 - (i \sqrt{a - i b - c} \right. \right. \right.
 \end{aligned}$$



$$\begin{aligned} & \left( a \sec [d+e x]^2 \tan [d+e x] + \sec [d+e x]^2 (b+a \tan [d+e x]) \right) / \\ & \left( 2 \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) / \left( (a-i b-c)^{3/2} \right. \\ & \left. (-i+\tan [d+e x]) \right) - \left( \sec [d+e x]^2 (b(i+\tan [d+e x]) + 2(c+i a \right. \\ & \left. \tan [d+e x] - i \sqrt{a-i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])}) \right) / \\ & \left( (a-i b-c)^{3/2} (-i+\tan [d+e x])^2 \right) / \left( b(i+\tan [d+e x]) + \right. \\ & \left. 2(c+i a \tan [d+e x] - i \sqrt{a-i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])}) \right) \end{aligned}$$

**Problem 9: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \tan [d+e x] dx$$

Optimal (type 3, 570 leaves, 18 steps):

$$\begin{aligned} & \left( \sqrt{a^2+b^2+c(c+\sqrt{a^2+b^2-2ac+c^2})} - a(2c+\sqrt{a^2+b^2-2ac+c^2}) \right) \\ & \text{ArcTan} \left[ \left( b^2+(a-c) \left( a-c-\sqrt{a^2+b^2-2ac+c^2} \right) - b \sqrt{a^2+b^2-2ac+c^2} \cot [d+e x] \right) / \right. \\ & \left. \left( \sqrt{2} (a^2+b^2-2ac+c^2)^{1/4} \sqrt{a^2+b^2+c(c+\sqrt{a^2+b^2-2ac+c^2})} - \right. \right. \\ & \left. \left. a(2c+\sqrt{a^2+b^2-2ac+c^2}) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \right) \right] / \\ & \left( \sqrt{2} (a^2+b^2-2ac+c^2)^{1/4} e \right) + \frac{\sqrt{a} \text{ArcTanh} \left[ \frac{2a+b \cot [d+e x]}{2\sqrt{a} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} \right]}{e} - \\ & \left( \sqrt{a^2+b^2+c(c-\sqrt{a^2+b^2-2ac+c^2})} - a(2c-\sqrt{a^2+b^2-2ac+c^2}) \right) \\ & \text{ArcTanh} \left[ \left( b^2+(a-c) \left( a-c+\sqrt{a^2+b^2-2ac+c^2} \right) + b \sqrt{a^2+b^2-2ac+c^2} \cot [d+e x] \right) / \right. \\ & \left. \left( \sqrt{2} (a^2+b^2-2ac+c^2)^{1/4} \right. \right. \\ & \left. \left. \sqrt{a^2+b^2+c(c-\sqrt{a^2+b^2-2ac+c^2})} - a(2c-\sqrt{a^2+b^2-2ac+c^2}) \right) \right. \\ & \left. \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \right] / \left( \sqrt{2} (a^2+b^2-2ac+c^2)^{1/4} e \right) \end{aligned}$$

Result (type 3, 2361 leaves):

$$\begin{aligned}
 & \left( \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right. \\
 & \left( 2 \sqrt{a} \operatorname{Log} [b + 2 a \tan [d + e x] + 2 \sqrt{a} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])}] - \right. \\
 & \left. \sqrt{a + i b - c} \operatorname{Log} \left[ \left( 2 i \left( b + 2 i c + 2 a \tan [d + e x] + i b \tan [d + e x] + 2 \sqrt{a + i b - c} \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \left( (a + i b - c)^{3/2} (i + \tan [d + e x]) \right) \right] + \\
 & \left. \sqrt{a - i b - c} \operatorname{Log} \left[ \left( 2 b (i + \tan [d + e x]) + 4 \left( c + i a \tan [d + e x] - i \sqrt{a - i b - c} \right. \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \left( (a - i b - c)^{3/2} (-i + \tan [d + e x]) \right) \right] \Big) \\
 & \sqrt{\left( -\frac{a}{-1 + \cos [2 (d + e x)]} - \frac{c}{-1 + \cos [2 (d + e x)]} + \frac{a \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \right. \\
 & \left. \frac{c \cos [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} - \frac{b \sin [2 (d + e x)]}{-1 + \cos [2 (d + e x)]} \right)} \\
 & \tan [d + e x]^2 \Big) / \left( 2 e \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \\
 & \left( -\frac{1}{4 (c + \tan [d + e x] (b + a \tan [d + e x]))^{3/2}} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right. \\
 & \left( 2 \sqrt{a} \operatorname{Log} [b + 2 a \tan [d + e x] + 2 \sqrt{a} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])}] - \right. \\
 & \left. \sqrt{a + i b - c} \operatorname{Log} \left[ \left( 2 i \left( b + 2 i c + 2 a \tan [d + e x] + i b \tan [d + e x] + \right. \right. \right. \right. \\
 & \left. \left. \left. 2 \sqrt{a + i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \left( (a + i b - c)^{3/2} (i + \tan [d + e x]) \right) \right] + \\
 & \left. \sqrt{a - i b - c} \operatorname{Log} \left[ \left( 2 b (i + \tan [d + e x]) + 4 \left( c + i a \tan [d + e x] - i \sqrt{a - i b - c} \right. \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \left( (a - i b - c)^{3/2} (-i + \tan [d + e x]) \right) \right] \Big) \tan [d + e x] \\
 & \left( a \sec [d + e x]^2 \tan [d + e x] + \sec [d + e x]^2 (b + a \tan [d + e x]) \right) + \\
 & \frac{1}{2 \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])}} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \\
 & \left( 2 \sqrt{a} \operatorname{Log} [b + 2 a \tan [d + e x] + 2 \sqrt{a} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])}] - \right. \\
 & \left. \sqrt{a + i b - c} \operatorname{Log} \left[ \left( 2 i \left( b + 2 i c + 2 a \tan [d + e x] + i b \tan [d + e x] + \right. \right. \right. \right. \\
 & \left. \left. \left. 2 \sqrt{a + i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \left( (a + i b - c)^{3/2} (i + \tan [d + e x]) \right) \right] + \\
 & \left. \sqrt{a - i b - c} \operatorname{Log} \left[ \left( 2 b (i + \tan [d + e x]) + 4 \left( c + i a \tan [d + e x] - i \sqrt{a - i b - c} \right. \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \left( (a - i b - c)^{3/2} (-i + \tan [d + e x]) \right) \right] \Big) \sec [d + e x]^2 +
 \end{aligned}$$

$$\begin{aligned}
 & \left( -b \operatorname{Csc}[d+ex]^2 - 2c \operatorname{Cot}[d+ex] \operatorname{Csc}[d+ex]^2 \right) \\
 & \left( 2\sqrt{a} \operatorname{Log}[b+2a \operatorname{Tan}[d+ex] + 2\sqrt{a} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex])] - \right. \\
 & \quad \left. \sqrt{a+ib-c} \operatorname{Log}\left[ \left( 2i \left( b+2ic+2a \operatorname{Tan}[d+ex] + ib \operatorname{Tan}[d+ex] + \right. \right. \right. \right. \\
 & \quad \quad \left. \left. \left. 2\sqrt{a+ib-c} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) \right] / \right. \\
 & \quad \left( (a+ib-c)^{3/2} (i+\operatorname{Tan}[d+ex]) \right) + \sqrt{a-ib-c} \operatorname{Log}\left[ \left( 2b(i+\operatorname{Tan}[d+ex]) + \right. \right. \\
 & \quad \left. \left. 4(c+ia \operatorname{Tan}[d+ex] - i\sqrt{a-ib-c} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex])) \right) \right] / \right. \\
 & \quad \left. \left( (a-ib-c)^{3/2} (-i+\operatorname{Tan}[d+ex]) \right) \right] \operatorname{Tan}[d+ex] \Big) / \\
 & \left( 4\sqrt{a+b \operatorname{Cot}[d+ex] + c \operatorname{Cot}[d+ex]^2} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) + \\
 & \frac{1}{2\sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex])} \\
 & \sqrt{a+b \operatorname{Cot}[d+ex] + c \operatorname{Cot}[d+ex]^2} \operatorname{Tan}[d+ex] \\
 & \left( \left( 2\sqrt{a} \left( 2a \operatorname{Sec}[d+ex]^2 + \left( \sqrt{a} (a \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + \operatorname{Sec}[d+ex]^2 \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (b+a \operatorname{Tan}[d+ex]) \right) \right) \right) / \left( \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) \Big) / \\
 & \left( b+2a \operatorname{Tan}[d+ex] + 2\sqrt{a} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) + \\
 & \left( i(a+ib-c)^2 (i+\operatorname{Tan}[d+ex]) \left( \left( 2i \left( 2a \operatorname{Sec}[d+ex]^2 + ib \operatorname{Sec}[d+ex]^2 + \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{a+ib-c} (a \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + \operatorname{Sec}[d+ex]^2 \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (b+a \operatorname{Tan}[d+ex]) \right) \right) \right) / \left( \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) \Big) \Big) / \\
 & \left( (a+ib-c)^{3/2} (i+\operatorname{Tan}[d+ex]) \right) - \left( 2i \operatorname{Sec}[d+ex]^2 \left( b+2ic+2a \operatorname{Tan}[d+ex] + \right. \right. \\
 & \quad \left. \left. ib \operatorname{Tan}[d+ex] + 2\sqrt{a+ib-c} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) \Big) / \\
 & \left( (a+ib-c)^{3/2} (i+\operatorname{Tan}[d+ex])^2 \right) \Big) \Big) / \left( 2 \left( b+2ic+2a \operatorname{Tan}[d+ex] + ib \operatorname{Tan}[d+ex] \right. \right. \\
 & \quad \left. \left. + 2\sqrt{a+ib-c} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) + \left( (a-ib-c)^2 \right. \\
 & \quad \left. (-i+\operatorname{Tan}[d+ex]) \left( \left( 2b \operatorname{Sec}[d+ex]^2 + 4 \left( ia \operatorname{Sec}[d+ex]^2 - \left( i\sqrt{a-ib-c} \right. \right. \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (a \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + \operatorname{Sec}[d+ex]^2 (b+a \operatorname{Tan}[d+ex])) \right) \right) \right) / \right. \\
 & \quad \left. \left( 2\sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) \Big) \Big) / \left( (a-ib-c)^{3/2} \right. \\
 & \quad \left. (-i+\operatorname{Tan}[d+ex]) \right) - \left( \operatorname{Sec}[d+ex]^2 \left( 2b(i+\operatorname{Tan}[d+ex]) + 4 \left( c+ia \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \operatorname{Tan}[d+ex] - i\sqrt{a-ib-c} \sqrt{c+\operatorname{Tan}[d+ex]} (b+a \operatorname{Tan}[d+ex]) \right) \right) \right) \Big) \Big) / \\
 & \left( (a-ib-c)^{3/2} (-i+\operatorname{Tan}[d+ex])^2 \right) \Big) \Big) / \left( 2b(i+\operatorname{Tan}[d+ex]) + \right.
 \end{aligned}$$

$$4 \left( c + i a \tan [d + e x] - i \sqrt{a - i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \Bigg|$$

**Problem 10: Humongous result has more than 200000 leaves.**

$$\int \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \tan [d + e x]^3 dx$$

Optimal (type 3, 691 leaves, 21 steps):

$$\begin{aligned} & - \left( \left( \sqrt{a^2 + b^2 + c} \left( c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right) \right. \\ & \quad \left. \text{ArcTan} \left[ \left( b^2 + (a - c) \left( a - c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - b \sqrt{a^2 + b^2 - 2 a c + c^2} \cot [d + e x] \right) \right] \right) / \\ & \quad \left( \sqrt{2} (a^2 + b^2 - 2 a c + c^2)^{1/4} \sqrt{a^2 + b^2 + c} \left( c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - \right. \\ & \quad \left. a \left( 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right) \Bigg| / \\ & \quad \left( \sqrt{2} (a^2 + b^2 - 2 a c + c^2)^{1/4} e \right) - \frac{\sqrt{a} \text{ArcTanh} \left[ \frac{2 a + b \cot [d + e x]}{2 \sqrt{a} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}} \right]}{e} - \\ & \quad \frac{(b^2 - 4 a c) \text{ArcTanh} \left[ \frac{2 a + b \cot [d + e x]}{2 \sqrt{a} \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}} \right]}{8 a^{3/2} e} + \\ & \quad \left( \sqrt{a^2 + b^2 + c} \left( c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - a \left( 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \right) \\ & \quad \text{ArcTanh} \left[ \left( b^2 + (a - c) \left( a - c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) + b \sqrt{a^2 + b^2 - 2 a c + c^2} \cot [d + e x] \right) \right] / \\ & \quad \left( \sqrt{2} (a^2 + b^2 - 2 a c + c^2)^{1/4} \sqrt{a^2 + b^2 + c} \left( c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - \right. \\ & \quad \left. a \left( 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right) \Bigg| / \\ & \quad \left( \sqrt{2} (a^2 + b^2 - 2 a c + c^2)^{1/4} e \right) + \frac{1}{4 a e} (2 a + b \cot [d + e x]) \\ & \quad \frac{\sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2}}{\tan [d + e x]^2} \end{aligned}$$

Result (type ?, 465721 leaves): Display of huge result suppressed!

**Problem 11: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.**

$$\int \frac{\cot [d + e x]^7}{(a + b \cot [d + e x] + c \cot [d + e x]^2)^{3/2}} dx$$

Optimal (type 3, 1189 leaves, 20 steps):

$$\begin{aligned}
 & - \frac{3 b \operatorname{ArcTanh}\left[\frac{b+2 c \cot [d+e x]}{2 \sqrt{c} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{2 c^{5/2} e} + \\
 & \frac{5 b\left(7 b^2-12 a c\right) \operatorname{ArcTanh}\left[\frac{b+2 c \cot [d+e x]}{2 \sqrt{c} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{16 c^{9/2} e} + \\
 & \left( \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2} + (a-c) \sqrt{a^2+b^2-2 a c+c^2} \operatorname{ArcTanh}\left[ \right. \right. \\
 & \quad \left. \left. \left( b^2-(a-c)\left(a-c+\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right) / \right. \right. \\
 & \quad \left. \left. \left( \sqrt{2} \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2} + (a-c) \sqrt{a^2+b^2-2 a c+c^2} \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \right) \right] \right) / \left( \sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3/2} e \right) - \\
 & \left( \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2} - (a-c) \sqrt{a^2+b^2-2 a c+c^2} \operatorname{ArcTanh}\left[ \right. \right. \\
 & \quad \left. \left. \left( b^2-(a-c)\left(a-c-\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right) / \right. \right. \\
 & \quad \left. \left. \left( \sqrt{2} \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2} - (a-c) \sqrt{a^2+b^2-2 a c+c^2} \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \right) \right] \right) / \\
 & \left( \sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3/2} e \right) - \frac{2\left(2 a+b \cot [d+e x]\right)}{\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} + \\
 & \frac{2 \cot [d+e x]^2\left(2 a+b \cot [d+e x]\right)}{\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{2 \cot [d+e x]^4\left(2 a+b \cot [d+e x]\right)}{\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} + \\
 & \frac{2\left(a\left(b^2-2(a-c) c\right)+b c(a+c) \cot [d+e x]\right)}{\left(b^2+(a-c)^2\right)\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{\left(7 b^2-16 a c\right) \cot [d+e x]^2 \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}{3 c^2\left(b^2-4 a c\right) e} +
 \end{aligned}$$

$$\frac{2 b \cot [d+e x]^3 \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}{c\left(b^2-4 a c\right) e} +$$

$$\frac{\left(3 b^2-8 a c-2 b c \cot [d+e x]\right) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}{c^2\left(b^2-4 a c\right) e} -$$

$$\left(\frac{\left(105 b^4-460 a b^2 c+256 a^2 c^2-2 b c\left(35 b^2-116 a c\right) \cot [d+e x]\right) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}{\left(24 c^4\left(b^2-4 a c\right) e\right)}\right)$$

Result (type 3, 5618 leaves):

$$\frac{1}{e} \sqrt{\left(\left(-a-c+a \cos [2(d+e x)]-c \cos [2(d+e x)]-b \sin [2(d+e x)]\right) / \left(-1+\cos [2(d+e x)]\right)\right)}$$

$$\left(\frac{\left(105 a^3 b^4+105 a b^6-460 a^4 b^2 c-727 a^2 b^4 c-57 b^6 c+256 a^5 c^2+1364 a^3 b^2 c^2+407 a b^4 c^2-448 a^4 c^3-740 a^2 b^2 c^3-25 b^4 c^3+96 a^3 c^4+44 a b^2 c^4+224 a^2 c^5+32 b^2 c^5-128 a c^6\right) / \left(24(a-c)(a-i b-c)(a+i b-c) c^4\left(-b^2+4 a c\right)\right)+\frac{11 b \cot [d+e x]}{12 c^3}-\frac{\operatorname{Csc}[d+e x]^2}{3 c^2}+\left(2\left(2 a^3 b^4+2 a b^6-8 a^4 b^2 c-12 a^2 b^4 c+4 a^5 c^2+18 a^3 b^2 c^2-4 a^4 c^3+a^4 b^3 \sin [2(d+e x)]+2 a^2 b^5 \sin [2(d+e x)]+b^7 \sin [2(d+e x)]-3 a^5 b c \sin [2(d+e x)]-10 a^3 b^3 c \sin [2(d+e x)]-7 a b^5 c \sin [2(d+e x)]+10 a^4 b c^2 \sin [2(d+e x)]+14 a^2 b^3 c^2 \sin [2(d+e x)]-7 a^3 b c^3 \sin [2(d+e x)]\right) / \left((a-c)(a-i b-c)(a+i b-c) c^3\left(-b^2+4 a c\right)\right)}{\left(-a-c+a \cos [2(d+e x)]-c \cos [2(d+e x)]-b \sin [2(d+e x)]\right)}\right) +$$

$$\left(\sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\left(-b(i a+b-i c)(-i a+b+i c)\right)\left(35 b^2-12 c(5 a+2 c)\right) \log [\tan [d+e x]]+\frac{1}{\sqrt{a-i b-c}} 8(a+i b-c) c^{9 / 2} \log \left[\frac{(i b+2 c+(2 i a+b) \tan [d+e x]-2 i \sqrt{a-i b-c} \sqrt{c+b \tan [d+e x]+a \tan [d+e x]^2})}{\left(8 \sqrt{a-i b-c}(a+i b-c) c^4(-i+\tan [d+e x])\right)}\right]+\frac{1}{\sqrt{a+i b-c}} 8 c^{9 / 2}(-a+i b+c) \log \left[\frac{(i(b+2 i c+2 a \tan [d+e x]+i b \tan [d+e x]+2 \sqrt{a+i b-c} \sqrt{c+\tan [d+e x](b+a \tan [d+e x])})}{\left(8(a-i b-c) \sqrt{a+i b-c} c^4(i+\tan [d+e x])\right)}\right]+b(i a+b-i c)(-i a+b+i c)\left(35 b^2-12 c(5 a+2 c)\right) \log \left[2 c+b \tan [d+e x]+2 \sqrt{c} \sqrt{c+\tan [d+e x](b+a \tan [d+e x])}\right]\right) -$$

$$\left(-\left(2 b \sqrt{\left(-\frac{a}{-1+\cos [2(d+e x)]}-\frac{c}{-1+\cos [2(d+e x)]}+\frac{a \cos [2(d+e x)]}{-1+\cos [2(d+e x)]}\right)}\right)\right)$$

$$\begin{aligned}
 & \left. \left( \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c)(a+ib-c) \\
 & (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) + \\
 & \left( 35 a^2 b^3 \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / (8(a-ib-c)(a+ib-c) \\
 & c^4 (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) + \\
 & \left( 35 b^5 \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / (8(a-ib-c)(a+ib-c) \\
 & c^4 (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) - \\
 & \left( 15 a^3 b \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / (2(a-ib-c)(a+ib-c) \\
 & c^3 (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) - \\
 & \left( 65 a b^3 \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / (4(a-ib-c)(a+ib-c) \\
 & c^3 (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) + \\
 & \left( 12 a^2 b \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c)(a+ib-c) \\
 & c^2 (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) + \\
 & \left( 11 b^3 \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / (8(a-ib-c)(a+ib-c) \\
 & c^2 (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) - \\
 & \left( 3 a b \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right. \right.
 \end{aligned}$$

$$\begin{aligned}
& \left. \left( \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / (2(a-ib-c)(a+ib-c) \\
& c(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) - \\
& \left( b \cos[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right. \right. \\
& \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c - \\
& c)(a+ib-c)(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) + \\
& \left( a \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right. \right. \\
& \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c - \\
& c)(a+ib-c)(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)])) - \\
& \left( c \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right. \right. \\
& \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / \\
& ((a-ib-c)(a+ib-c)(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - \\
& b \sin[2(d+ex)])) \left. \right) \tan[d+ex] \Big) / \\
& \left( 16 c^{9/2} (a^2 + b^2 - 2 a c + c^2) e^{\sqrt{c + \tan[d+ex]} (b + a \tan[d+ex])} \right. \\
& \left. \left( - \left( 1 / \left( 32 c^{9/2} (a^2 + b^2 - 2 a c + c^2) (c + \tan[d+ex] (b + a \tan[d+ex]))^{3/2} \right) \right) \right. \right. \\
& \left. \left. \sqrt{a + b \cot[d+ex] + c \cot[d+ex]^2} \right. \right. \\
& \left. \left( -b(i a + b - i c)(-i a + b + i c)(35 b^2 - 12 c(5 a + 2 c)) \log[\tan[d+ex]] + \right. \right. \\
& \left. \left. \frac{1}{\sqrt{a - i b - c}} 8(a + i b - c) c^{9/2} \log\left[ \left( i b + 2 c + (2 i a + b) \tan[d+ex] - \right. \right. \right. \right. \\
& \left. \left. \left. 2 i \sqrt{a - i b - c} \sqrt{c + b \tan[d+ex] + a \tan[d+ex]^2} \right) \right] \right) / \\
& \left( 8 \sqrt{a - i b - c} (a + i b - c) c^4 (-i + \tan[d+ex]) \right) \left. \right) + \frac{1}{\sqrt{a + i b - c}} \\
& 8 c^{9/2} (-a + i b + c) \log\left[ \left( i \left( b + 2 i c + 2 a \tan[d+ex] + i b \tan[d+ex] + 2 \sqrt{a + i b - c} \right. \right. \right. \\
& \left. \left. \left. \sqrt{c + \tan[d+ex]} (b + a \tan[d+ex]) \right) \right) \right] / \left( 8(a - i b - c) \sqrt{a + i b - c} c^4 \right. \\
& \left. (i + \tan[d+ex]) \right) \left. \right) + b(i a + b - i c)(-i a + b + i c)(35 b^2 - 12 c(5 a + 2 c)) \\
& \left. \log\left[ 2 c + b \tan[d+ex] + 2 \sqrt{c} \sqrt{c + \tan[d+ex]} (b + a \tan[d+ex]) \right] \right) \Big)
\end{aligned}$$



$$\begin{aligned}
 & \left( \frac{1}{\left( 16 c^{9/2} (a^2 + b^2 - 2 a c + c^2) \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x]) \right)} \right) \\
 & \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \\
 & \left( -b (i a + b - i c) (-i a + b + i c) (35 b^2 - 12 c (5 a + 2 c)) \log [\tan [d + e x]] + \right. \\
 & \left. \frac{1}{\sqrt{a - i b - c}} 8 (a + i b - c) c^{9/2} \log \left[ \left( i b + 2 c + (2 i a + b) \tan [d + e x] - 2 \right. \right. \right. \\
 & \left. \left. \left. i \sqrt{a - i b - c} \sqrt{c + b \tan [d + e x] + a \tan [d + e x]^2} \right) \right] \right) / \\
 & \left( 8 \sqrt{a - i b - c} (a + i b - c) c^4 (-i + \tan [d + e x]) \right) + \frac{1}{\sqrt{a + i b - c}} \\
 & 8 c^{9/2} (-a + i b + c) \log \left[ \left( i \left( b + 2 i c + 2 a \tan [d + e x] + i b \tan [d + e x] + 2 \sqrt{a + i b - c} \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x]) \right) \right) \right] / \left( 8 (a - i b - c) \sqrt{a + i b - c} c^4 \right. \\
 & \left. (i + \tan [d + e x]) \right) + b (i a + b - i c) (-i a + b + i c) (35 b^2 - 12 c (5 a + 2 c)) \\
 & \left. \log [2 c + b \tan [d + e x] + 2 \sqrt{c} \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x])] \right) \\
 & \sec [d + e x]^2 + \left( (-b \csc [d + e x]^2 - 2 c \cot [d + e x] \csc [d + e x]^2) \right. \\
 & \left. (-b (i a + b - i c) (-i a + b + i c) (35 b^2 - 12 c (5 a + 2 c)) \log [\tan [d + e x]] + \right. \\
 & \left. \frac{1}{\sqrt{a - i b - c}} 8 (a + i b - c) c^{9/2} \log \left[ \left( i b + 2 c + (2 i a + b) \tan [d + e x] - \right. \right. \right. \\
 & \left. \left. \left. 2 i \sqrt{a - i b - c} \sqrt{c + b \tan [d + e x] + a \tan [d + e x]^2} \right) \right] \right) / \\
 & \left( 8 \sqrt{a - i b - c} (a + i b - c) c^4 (-i + \tan [d + e x]) \right) + \frac{1}{\sqrt{a + i b - c}} \\
 & 8 c^{9/2} (-a + i b + c) \log \left[ \left( i \left( b + 2 i c + 2 a \tan [d + e x] + i b \tan [d + e x] + 2 \sqrt{a + i b - c} \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x]) \right) \right) \right] / \left( 8 (a - i b - c) \sqrt{a + i b - c} c^4 \right. \\
 & \left. (i + \tan [d + e x]) \right) + b (i a + b - i c) (-i a + b + i c) (35 b^2 - 12 c (5 a + 2 c)) \\
 & \left. \log [2 c + b \tan [d + e x] + 2 \sqrt{c} \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x])] \right) \\
 & \tan [d + e x] \left. \right) / \left( 32 c^{9/2} (a^2 + b^2 - 2 a c + c^2) \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right. \\
 & \left. \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x]) \right) + \\
 & \left( \frac{1}{\left( 16 c^{9/2} (a^2 + b^2 - 2 a c + c^2) \sqrt{c + \tan [d + e x]} (b + a \tan [d + e x]) \right)} \right) \\
 & \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \tan [d + e x] \\
 & \left( -b (i a + b - i c) (-i a + b + i c) (35 b^2 - 12 c (5 a + 2 c)) \csc [d + e x] \sec [d + e x] + \right.
 \end{aligned}$$

$$\begin{aligned}
 & \left( b (i a + b - i c) (-i a + b + i c) (35 b^2 - 12 c (5 a + 2 c)) \left( b \operatorname{Sec}[d + e x]^2 + \right. \right. \\
 & \quad \left. \left( \sqrt{c} (a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2 (b + a \operatorname{Tan}[d + e x])) \right) \right) / \\
 & \quad \left( \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big) / \\
 & \left( 2 c + b \operatorname{Tan}[d + e x] + 2 \sqrt{c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) + \\
 & \left( 64 (a + i b - c)^2 c^{17/2} (-i + \operatorname{Tan}[d + e x]) \left( \left( (2 i a + b) \operatorname{Sec}[d + e x]^2 - \right. \right. \right. \\
 & \quad \left. \left. \left( i \sqrt{a - i b - c} (b \operatorname{Sec}[d + e x]^2 + 2 a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x]) \right) \right) \right) / \\
 & \quad \left( \sqrt{c + b \operatorname{Tan}[d + e x] + a \operatorname{Tan}[d + e x]^2} \right) \Big) / \left( 8 \sqrt{a - i b - c} (a + i b - c) c^4 \right. \\
 & \quad \left. (-i + \operatorname{Tan}[d + e x]) \right) - \left( \operatorname{Sec}[d + e x]^2 \left( i b + 2 c + (2 i a + b) \operatorname{Tan}[d + e x] - \right. \right. \\
 & \quad \left. \left. 2 i \sqrt{a - i b - c} \sqrt{c + b \operatorname{Tan}[d + e x] + a \operatorname{Tan}[d + e x]^2} \right) \right) / \\
 & \quad \left( 8 \sqrt{a - i b - c} (a + i b - c) c^4 (-i + \operatorname{Tan}[d + e x])^2 \right) \Big) / \left( i b + 2 c + \right. \\
 & \quad \left. (2 i a + b) \operatorname{Tan}[d + e x] - 2 i \sqrt{a - i b - c} \sqrt{c + b \operatorname{Tan}[d + e x] + a \operatorname{Tan}[d + e x]^2} \right) - \\
 & \left( 64 i (a - i b - c) c^{17/2} (-a + i b + c) (i + \operatorname{Tan}[d + e x]) \left( \left( i \left( 2 a \operatorname{Sec}[d + e x]^2 + \right. \right. \right. \right. \\
 & \quad \left. \left. \left. i b \operatorname{Sec}[d + e x]^2 + \left( \sqrt{a + i b - c} (a \operatorname{Sec}[d + e x]^2 \operatorname{Tan}[d + e x] + \operatorname{Sec}[d + e x]^2 \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (b + a \operatorname{Tan}[d + e x]) \right) \right) \right) \right) / \left( \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big) \Big) / \\
 & \quad \left( 8 (a - i b - c) \sqrt{a + i b - c} c^4 (i + \operatorname{Tan}[d + e x]) \right) - \left( i \operatorname{Sec}[d + e x]^2 \right. \\
 & \quad \left. (b + 2 i c + 2 a \operatorname{Tan}[d + e x] + i b \operatorname{Tan}[d + e x] + 2 \sqrt{a + i b - c} \right. \\
 & \quad \left. \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big) / \left( 8 (a - i b - c) \right. \\
 & \quad \left. \sqrt{a + i b - c} c^4 (i + \operatorname{Tan}[d + e x])^2 \right) \Big) / \left( b + 2 i c + 2 a \operatorname{Tan}[d + e x] + \right. \\
 & \quad \left. i b \operatorname{Tan}[d + e x] + 2 \sqrt{a + i b - c} \sqrt{c + \operatorname{Tan}[d + e x] (b + a \operatorname{Tan}[d + e x])} \right) \Big) \Big) \Big)
 \end{aligned}$$

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

$$\int \frac{\operatorname{Cot}[d + e x]^5}{(a + b \operatorname{Cot}[d + e x] + c \operatorname{Cot}[d + e x]^2)^{3/2}} dx$$

Optimal (type 3, 865 leaves, 14 steps):

$$\begin{aligned}
 & \frac{3 b \operatorname{ArcTanh}\left[\frac{b+2 c \cot [d+e x]}{2 \sqrt{c} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{2 c^{5/2} e} - \\
 & \left( \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2+(a-c) \sqrt{a^2+b^2-2 a c+c^2}} \operatorname{ArcTanh}\left[\frac{\left(b^2-(a-c)\left(a-c+\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right)}{\left(\sqrt{2} \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2+(a-c) \sqrt{a^2+b^2-2 a c+c^2}}\right.}\right.\right. \\
 & \left. \left. \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right)\right] \Bigg) / \left(\sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3/2} e\right) + \\
 & \left( \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2-(a-c) \sqrt{a^2+b^2-2 a c+c^2}} \operatorname{ArcTanh}\left[\frac{\left(b^2-(a-c)\left(a-c-\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right)}{\left(\sqrt{2} \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2-(a-c) \sqrt{a^2+b^2-2 a c+c^2}}\right.}\right.\right. \\
 & \left. \left. \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right)\right] \Bigg) / \\
 & \left(\sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3/2} e\right) + \frac{2(2 a+b \cot [d+e x])}{\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{2 \cot [d+e x]^2(2 a+b \cot [d+e x])}{\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{2(a\left(b^2-2(a-c) c\right)+b c(a+c) \cot [d+e x])}{\left(b^2+(a-c)^2\right)\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{\left(3 b^2-8 a c-2 b c \cot [d+e x]\right) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}{c^2\left(b^2-4 a c\right) e}
 \end{aligned}$$

Result (type 3, 4537 leaves):

$$\begin{aligned}
 & \frac{1}{e} \sqrt{\frac{-a-c+a \cos [2(d+e x)]-c \cos [2(d+e x)]-b \sin [2(d+e x)]}{-1+\cos [2(d+e x)]}} \\
 & \left(-\left(\left(-3 a^3 b^2-3 a b^4+8 a^4 c+15 a^2 b^2 c+b^4 c-16 a^3 c^2-7 a b^2 c^2+12 a^2 c^3+b^2 c^3-4 a c^4\right) / \right.\right. \\
 & \left.\left.\left((a-c)(a-i b-c)(a+i b-c) c^2\left(-b^2+4 a c\right)\right)\right)-\right. \\
 & \left.\left(2\left(-2 a^3 b^2-2 a b^4+4 a^4 c+8 a^2 b^2 c-4 a^3 c^2-a^4 b \sin [2(d+e x)]-2 a^2 b^3 \sin [2(d+e x)]-b^5 \sin [2(d+e x)]+6 a^3 b c \sin [2(d+e x)]+5 a b^3 c \sin [2(d+e x)]\right)-\right.\right.
 \end{aligned}$$

$$\begin{aligned}
 & \left( \frac{5 a^2 b c^2 \operatorname{Sin}\left[2\left(d+e x\right)\right]}{\left(-a-c+a \operatorname{Cos}\left[2\left(d+e x\right)\right]-c \operatorname{Cos}\left[2\left(d+e x\right)\right]-b \operatorname{Sin}\left[2\left(d+e x\right)\right]\right)} \right) / \left( (a-i b-c)(a+i b-c) c\left(-b^2+4 a c\right) \right. \\
 & \left. \sqrt{a+b \operatorname{Cot}\left[d+e x\right]+c \operatorname{Cot}\left[d+e x\right]^2}\left(3 b(i a+b-i c)(-i a+b+i c) \operatorname{Log}\left[\operatorname{Tan}\left[d+e x\right]\right]+ \right. \right. \\
 & \left. \frac{1}{\sqrt{a-i b-c}}(a+i b-c) c^{5 / 2} \operatorname{Log}\left[ \right. \right. \\
 & \left. \left. \left(i b+2 c+(2 i a+b) \operatorname{Tan}\left[d+e x\right]-2 i \sqrt{a-i b-c} \sqrt{c+b \operatorname{Tan}\left[d+e x\right]+a \operatorname{Tan}\left[d+e x\right]^2}\right) \right] \right) / \\
 & \left. \left(\sqrt{a-i b-c}(a+i b-c) c^2(-i+\operatorname{Tan}\left[d+e x\right])\right)\right)+\frac{1}{\sqrt{a+i b-c}} \\
 & c^{5 / 2}(-a+i b+c) \operatorname{Log}\left[\left(i\left(b+2 i c+2 a \operatorname{Tan}\left[d+e x\right]+i b \operatorname{Tan}\left[d+e x\right]+ \right. \right. \right. \\
 & \left. \left. \left. 2 \sqrt{a+i b-c} \sqrt{c+\operatorname{Tan}\left[d+e x\right]\left(b+a \operatorname{Tan}\left[d+e x\right]\right)}\right)\right] \right) / \\
 & \left. \left((a-i b-c) \sqrt{a+i b-c} c^2(i+\operatorname{Tan}\left[d+e x\right])\right)\right)-3 b(i a+b-i c)(-i a+b+i c) \\
 & \operatorname{Log}\left[2 c+b \operatorname{Tan}\left[d+e x\right]+2 \sqrt{c} \sqrt{c+\operatorname{Tan}\left[d+e x\right]\left(b+a \operatorname{Tan}\left[d+e x\right]\right)}\right] \\
 & \left(\left(2 b \sqrt{\left(-\frac{a}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{c}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}+\frac{a \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\right. \right. \right. \\
 & \left. \left. \left. \frac{c \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{b \operatorname{Sin}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}\right)\right)} \right) / \left((a-i b-c)(a+i b-c) \right. \\
 & \left. (-a-c+a \operatorname{Cos}\left[2\left(d+e x\right)\right]-c \operatorname{Cos}\left[2\left(d+e x\right)\right]-b \operatorname{Sin}\left[2\left(d+e x\right)\right])\right)+ \\
 & \left(3 a^2 b \sqrt{\left(-\frac{a}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{c}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}+\frac{a \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\right. \right. \\
 & \left. \left. \left. \frac{c \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{b \operatorname{Sin}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}\right)\right)} \right) / \left((a-i b-c)(a+i b-c) \right. \\
 & \left. c^2(-a-c+a \operatorname{Cos}\left[2\left(d+e x\right)\right]-c \operatorname{Cos}\left[2\left(d+e x\right)\right]-b \operatorname{Sin}\left[2\left(d+e x\right)\right])\right)+ \\
 & \left(3 b^3 \sqrt{\left(-\frac{a}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{c}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}+\frac{a \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\right. \right. \\
 & \left. \left. \left. \frac{c \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{b \operatorname{Sin}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}\right)\right)} \right) / \left((a-i b-c)(a+i b-c) \right. \\
 & \left. c^2(-a-c+a \operatorname{Cos}\left[2\left(d+e x\right)\right]-c \operatorname{Cos}\left[2\left(d+e x\right)\right]-b \operatorname{Sin}\left[2\left(d+e x\right)\right])\right)- \\
 & \left(6 a b \sqrt{\left(-\frac{a}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{c}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}+\frac{a \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\right. \right. \\
 & \left. \left. \left. \frac{c \operatorname{Cos}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{b \operatorname{Sin}\left[2\left(d+e x\right)\right]}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}\right)\right)} \right) / \left((a-i b-c)(a+i b-c) \right. \\
 & \left. c(-a-c+a \operatorname{Cos}\left[2\left(d+e x\right)\right]-c \operatorname{Cos}\left[2\left(d+e x\right)\right]-b \operatorname{Sin}\left[2\left(d+e x\right)\right])\right)+ \\
 & \left(b \operatorname{Cos}\left[2\left(d+e x\right)\right] \sqrt{\left(-\frac{a}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}-\frac{c}{-1+\operatorname{Cos}\left[2\left(d+e x\right)\right]}+\right. \right.} \right.
 \end{aligned}$$

$$\begin{aligned}
 & \left. \left( \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / \left( (a-ib-c) \right. \\
 & \left. c) (a+ib-c) (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) \right) - \\
 & \left( a \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / \left( (a-ib-c) \right. \\
 & \left. c) (a+ib-c) (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) \right) + \\
 & \left( c \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / \\
 & \left( (a-ib-c) (a+ib-c) (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - \right. \\
 & \left. b \sin[2(d+ex)]) \right) \left. \right) \tan[d+ex] \Bigg) / \\
 & \left( 2 c^{5/2} (a^2+b^2-2ac+c^2) e^{\sqrt{c+\tan[d+ex]} (b+a \tan[d+ex])} \right. \\
 & \left. \left( \left( 1 / \left( 4 c^{5/2} (a^2+b^2-2ac+c^2) (c+\tan[d+ex]) (b+a \tan[d+ex]) \right)^{3/2} \right) \right. \right. \\
 & \left. \left. \sqrt{a+b \cot[d+ex]+c \cot[d+ex]^2} \left( 3b (ia+b-ic) (-ia+b+ic) \log[\tan[d+ex]] + \right. \right. \right. \\
 & \left. \left. \frac{1}{\sqrt{a-ib-c}} (a+ib-c) c^{5/2} \log \left[ \left( ib+2c+(2ia+b) \tan[d+ex]-2 \right. \right. \right. \right. \\
 & \left. \left. \left. \left. ia \sqrt{a-ib-c} \sqrt{c+b \tan[d+ex]+a \tan[d+ex]^2} \right) \right] \right) / \right. \\
 & \left. \left( \sqrt{a-ib-c} (a+ib-c) c^2 (-i+\tan[d+ex]) \right) \right) + \frac{1}{\sqrt{a+ib-c}} \\
 & c^{5/2} (-a+ib+c) \log \left[ \left( i \left( b+2ic+2a \tan[d+ex]+ib \tan[d+ex]+ \right. \right. \right. \\
 & \left. \left. \left. \left. 2 \sqrt{a+ib-c} \sqrt{c+\tan[d+ex]} (b+a \tan[d+ex]) \right) \right) \right] / \\
 & \left( (a-ib-c) \sqrt{a+ib-c} c^2 (i+\tan[d+ex]) \right) \left. \right) - 3b (ia+b-ic) \\
 & \left. \left( -ia+b+ic \right) \log \left[ 2c+b \tan[d+ex]+2 \sqrt{c} \sqrt{c+\tan[d+ex]} (b+a \tan[d+ex]) \right] \right) \\
 & \left. \tan[d+ex] (a \sec[d+ex]^2 \tan[d+ex]+ \sec[d+ex]^2 (b+a \tan[d+ex])) - \right. \\
 & \left. \left( 1 / \left( 2 c^{5/2} (a^2+b^2-2ac+c^2) \sqrt{c+\tan[d+ex]} (b+a \tan[d+ex]) \right) \right) \right) \\
 & \left. \sqrt{a+b \cot[d+ex]+c \cot[d+ex]^2} \left( 3b (ia+b-ic) (-ia+b+ic) \log[\tan[d+ex]] + \right. \right. \\
 & \left. \left. \frac{1}{\sqrt{a-ib-c}} (a+ib-c) c^{5/2} \log \left[ \left( ib+2c+(2ia+b) \tan[d+ex]-2 \right. \right. \right. \right. \right.
 \end{aligned}$$

$$\begin{aligned}
 & \left( \frac{i \sqrt{a - i b - c} \sqrt{c + b \tan[d + e x] + a \tan[d + e x]^2}}{\sqrt{a - i b - c} (a + i b - c) c^2 (-i + \tan[d + e x])} \right) + \frac{1}{\sqrt{a + i b - c}} \\
 & c^{5/2} (-a + i b + c) \text{Log} \left[ \left( i \left( b + 2 i c + 2 a \tan[d + e x] + i b \tan[d + e x] + \right. \right. \right. \\
 & \quad \left. \left. \left. 2 \sqrt{a + i b - c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \right) \right] / \\
 & \left( (a - i b - c) \sqrt{a + i b - c} c^2 (i + \tan[d + e x]) \right) - 3 b (i a + b - i c) (-i a + b + i c) \\
 & \text{Log} \left[ 2 c + b \tan[d + e x] + 2 \sqrt{c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right] \text{Sec}[d + e x]^2 - \\
 & \left( -b \text{Csc}[d + e x]^2 - 2 c \text{Cot}[d + e x] \text{Csc}[d + e x]^2 \right) \left( 3 b (i a + b - i c) (-i a + b + i c) \right. \\
 & \quad \left. \text{Log}[\tan[d + e x]] + \frac{1}{\sqrt{a - i b - c}} (a + i b - c) c^{5/2} \text{Log} \left[ i b + 2 c + \right. \right. \\
 & \quad \left. \left. (2 i a + b) \tan[d + e x] - 2 i \sqrt{a - i b - c} \sqrt{c + b \tan[d + e x] + a \tan[d + e x]^2} \right] \right) / \\
 & \left( \sqrt{a - i b - c} (a + i b - c) c^2 (-i + \tan[d + e x]) \right) + \frac{1}{\sqrt{a + i b - c}} \\
 & c^{5/2} (-a + i b + c) \text{Log} \left[ \left( i \left( b + 2 i c + 2 a \tan[d + e x] + i b \tan[d + e x] + \right. \right. \right. \\
 & \quad \left. \left. \left. 2 \sqrt{a + i b - c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \right) \right] / \left( (a - i b - c) \right. \\
 & \quad \left. \sqrt{a + i b - c} c^2 (i + \tan[d + e x]) \right) - 3 b (i a + b - i c) (-i a + b + i c) \text{Log} \left[ \right. \\
 & \quad \left. 2 c + b \tan[d + e x] + 2 \sqrt{c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right] \tan[d + e x] \Big/ \\
 & \left( 4 c^{5/2} (a^2 + b^2 - 2 a c + c^2) \sqrt{a + b \cot[d + e x] + c \cot[d + e x]^2} \right. \\
 & \quad \left. \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) - \\
 & \left( 1 / \left( 2 c^{5/2} (a^2 + b^2 - 2 a c + c^2) \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \right) \\
 & \sqrt{a + b \cot[d + e x] + c \cot[d + e x]^2} \tan[d + e x] \\
 & \left( 3 b (i a + b - i c) (-i a + b + i c) \text{Csc}[d + e x] \text{Sec}[d + e x] - \left( 3 b (i a + b - i c) \right. \right. \\
 & \quad \left. \left. (-i a + b + i c) \left( b \text{Sec}[d + e x]^2 + \left( \sqrt{c} (a \text{Sec}[d + e x]^2 \tan[d + e x] + \text{Sec}[d + e x]^2 \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (b + a \tan[d + e x]) \right) \right) \right) \right) / \left( \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \Big/ \\
 & \left( 2 c + b \tan[d + e x] + 2 \sqrt{c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) + \\
 & \left( (a + i b - c)^2 c^{9/2} (-i + \tan[d + e x]) \left( \left( (2 i a + b) \text{Sec}[d + e x]^2 - \right. \right. \right. \\
 & \quad \left. \left. \left. (i \sqrt{a - i b - c} (b \text{Sec}[d + e x]^2 + 2 a \text{Sec}[d + e x]^2 \tan[d + e x]) \right) \right) \right) / \\
 & \left( \sqrt{c + b \tan[d + e x] + a \tan[d + e x]^2} \right) \Big/ \left( \sqrt{a - i b - c} (a + i b - c) c^2 \right)
 \end{aligned}$$

$$\begin{aligned}
 & \left( -i + \tan[d + ex] \right) - \left( \sec[d + ex]^2 \left( i b + 2 c + (2 i a + b) \tan[d + ex] - \right. \right. \\
 & \quad \left. \left. 2 i \sqrt{a - i b - c} \sqrt{c + b \tan[d + ex] + a \tan[d + ex]^2} \right) \right) / \\
 & \left( \sqrt{a - i b - c} (a + i b - c) c^2 (-i + \tan[d + ex])^2 \right) / \left( i b + 2 c + \right. \\
 & \quad \left. (2 i a + b) \tan[d + ex] - 2 i \sqrt{a - i b - c} \sqrt{c + b \tan[d + ex] + a \tan[d + ex]^2} \right) - \\
 & \left( i (a - i b - c) c^{9/2} (-a + i b + c) (i + \tan[d + ex]) \right) \\
 & \left( \left( i \left( 2 a \sec[d + ex]^2 + i b \sec[d + ex]^2 + \sqrt{a + i b - c} \right. \right. \right. \\
 & \quad \left. \left. \left( a \sec[d + ex]^2 \tan[d + ex] + \sec[d + ex]^2 (b + a \tan[d + ex]) \right) \right) \right) / \\
 & \quad \left( \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])} \right) \right) / \left( (a - i b - c) \sqrt{a + i b - c} \right. \\
 & \quad \left. c^2 (i + \tan[d + ex]) \right) - \left( i \sec[d + ex]^2 \left( b + 2 i c + 2 a \tan[d + ex] + \right. \right. \\
 & \quad \left. \left. i b \tan[d + ex] + 2 \sqrt{a + i b - c} \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])} \right) \right) / \\
 & \left( (a - i b - c) \sqrt{a + i b - c} c^2 (i + \tan[d + ex])^2 \right) / \left( b + 2 i c + 2 a \tan[d + ex] + \right. \\
 & \quad \left. i b \tan[d + ex] + 2 \sqrt{a + i b - c} \sqrt{c + \tan[d + ex] (b + a \tan[d + ex])} \right) \right) \right)
 \end{aligned}$$

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

$$\int \frac{\cot[d + ex]^3}{(a + b \cot[d + ex] + c \cot[d + ex]^2)^{3/2}} dx$$

Optimal (type 3, 686 leaves, 10 steps):

$$\left( \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2+(a-c) \sqrt{a^2+b^2-2 a c+c^2}} \operatorname{ArcTanh}\left[\frac{\left(b^2-(a-c)\left(a-c+\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right)}{\left(\sqrt{2} \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2+(a-c) \sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right)}\right]\right) / \left(\sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3 / 2} e\right)-$$

$$\left( \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2-(a-c) \sqrt{a^2+b^2-2 a c+c^2}} \operatorname{ArcTanh}\left[\frac{\left(b^2-(a-c)\left(a-c-\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right)}{\left(\sqrt{2} \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2-(a-c) \sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right)}\right]\right) /$$

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

Result (type 3, 3282 leaves):

$$\frac{1}{e} \sqrt{\left(-a-c+a \cos [2(d+e x)]-c \cos [2(d+e x)]-b \sin [2(d+e x)]\right) / \left(-1+\cos [2(d+e x)]\right)}$$

$$\left(\frac{2 a\left(2 a^2+b^2-2 a c\right)}{\left(a-c\right)\left(a+i b-c\right)\left(-a b^2+i b^3+4 a^2 c-4 i a b c+b^2 c-4 a c^2\right)}+\frac{\left(\cos [2(d+e x)]-i \sin [2(d+e x)]\right)\left(i a^3 b+2 i a^2 b c+i b^3 c-3 i a b c^2+8 a^3 c \cos [2(d+e x)]+4 a b^2 c \cos [2(d+e x)]-8 a^2 c^2 \cos [2(d+e x)]-i a^3 b \cos [4(d+e x)]-2 i a^2 b c \cos [4(d+e x)]-i b^3 c \cos [4(d+e x)]+3 i a b c^2 \cos [4(d+e x)]+8 i a^3 c \sin [2(d+e x)]+4 i a b^2 c \sin [2(d+e x)]-8 i a^2 c^2 \sin [2(d+e x)]+a^3 b \sin [4(d+e x)]+2 a^2 b c \sin [4(d+e x)]+b^3 c \sin [4(d+e x)]-3 a b c^2 \sin [4(d+e x)]\right)}{\left(a-c\right)\left(a-i b-c\right)\left(a+i b-c\right)\left(-b^2+4 a c\right)\left(-a-c+a \cos [2(d+e x)]-c \cos [2(d+e x)]-b \sin [2(d+e x)]\right)}\right)+\left(\sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right)\left(\frac{1}{\left(a-i b-c\right)^{3 / 2}} \operatorname{Log}\left[\left(-4 c-4 i a \tan [d+e x]-\right.\right.\right.$$



$$\begin{aligned}
 & \left. \frac{2b \left( i + \tan[d+ex] \right) + 4i \sqrt{a-ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])}}{\left( \sqrt{a-ib-c} (a+ib-c) (-i + \tan[d+ex]) \right)} \right) - \\
 & \frac{1}{(a+ib-c)^{3/2}} \text{Log} \left[ \left( 4c + 2b (-i + \tan[d+ex]) - \right. \right. \\
 & \left. \left. 4i \left( a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right) \right] / \\
 & \left( (a-ib-c) \sqrt{a+ib-c} (i + \tan[d+ex]) \right) \Bigg] \\
 & \left( \left( b \sqrt{\left( -\frac{a}{-1 + \cos[2(d+ex)]} - \frac{c}{-1 + \cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \right. \right. \right. \\
 & \left. \left. \frac{c \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1 + \cos[2(d+ex)]} \right)} \right) / \left( (a-ib-c) (a+ib-c) \right. \\
 & \left. (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) \right) - \\
 & \left( b \cos[2(d+ex)] \sqrt{\left( -\frac{a}{-1 + \cos[2(d+ex)]} - \frac{c}{-1 + \cos[2(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1 + \cos[2(d+ex)]} \right)} \right) / \left( (a-ib-c) \right. \\
 & \left. (a+ib-c) (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) \right) + \\
 & \left( a \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1 + \cos[2(d+ex)]} - \frac{c}{-1 + \cos[2(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1 + \cos[2(d+ex)]} \right)} \right) / \left( (a-ib-c) \right. \\
 & \left. (a+ib-c) (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) \right) - \\
 & \left( c \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1 + \cos[2(d+ex)]} - \frac{c}{-1 + \cos[2(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1 + \cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1 + \cos[2(d+ex)]} \right)} \right) / \\
 & \left( (a-ib-c) (a+ib-c) (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - \right. \\
 & \left. b \sin[2(d+ex)]) \right) \Bigg] \tan[d+ex] \Bigg] / \\
 & \left( 2e \sqrt{c+b \tan[d+ex] + a \tan[d+ex]^2} \left( - \left( \left( \sqrt{a+b \cot[d+ex] + c \cot[d+ex]^2} \right. \right. \right. \right. \\
 & \left. \left. \left( \text{Log} \left[ \left( -4c - 4i a \tan[d+ex] - 2b (i + \tan[d+ex]) + 4i \sqrt{a-ib-c} \right. \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan[d+ex] (b+a \tan[d+ex])} \right) \right] / \left( \sqrt{a-ib-c} (a+ib-c) \right. \right. \right. \\
 & \left. \left. \left. (-i + \tan[d+ex]) \right) \right) \right) / (a-ib-c)^{3/2} - \text{Log} \left[ \left( 4c + 2b (-i + \tan[d+ex]) - \right. \right.
 \end{aligned}$$

$$\begin{aligned}
 & \left( 4 i \left( a \tan [d+e x] + \sqrt{a+i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right) / \\
 & \left( (a-i b-c) \sqrt{a+i b-c} (i+\tan [d+e x]) \right) / (a+i b-c)^{3/2} \\
 & \tan [d+e x] (b \sec [d+e x]^2+2 a \sec [d+e x]^2 \tan [d+e x]) / \\
 & \left( 4 (c+b \tan [d+e x]+a \tan [d+e x]^2)^{3/2} \right) + \\
 & \left( \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \left( \log \left[ (-4 c-4 i a \tan [d+e x]-2 b (i+\tan [d+e x]) \right. \right. \right. \\
 & \left. \left. \left. 4 i \sqrt{a-i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right] / \left( \sqrt{a-i b-c} (a+i b-c) \right. \right. \right. \\
 & \left. \left. \left. (-i+\tan [d+e x]) \right) \right) / (a-i b-c)^{3/2} - \log \left[ (4 c+2 b (-i+\tan [d+e x]) - \right. \right. \right. \\
 & \left. \left. \left. 4 i \left( a \tan [d+e x] + \sqrt{a+i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right) \right] / \right. \\
 & \left. \left( (a-i b-c) \sqrt{a+i b-c} (i+\tan [d+e x]) \right) \right) / (a+i b-c)^{3/2} \sec [d+e x]^2) / \\
 & \left( 2 \sqrt{c+b \tan [d+e x]+a \tan [d+e x]^2} \right) + \left( (-b \csc [d+e x]^2-2 c \cot [d+e x] \csc [d+e x]^2) \right. \\
 & \left. \left( \log \left[ (-4 c-4 i a \tan [d+e x]-2 b (i+\tan [d+e x]) +4 i \sqrt{a-i b-c} \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right] / \left( \sqrt{a-i b-c} (a+i b-c) \right. \right. \right. \\
 & \left. \left. \left. (-i+\tan [d+e x]) \right) \right) / (a-i b-c)^{3/2} - \log \left[ (4 c+2 b (-i+\tan [d+e x]) - \right. \right. \right. \\
 & \left. \left. \left. 4 i \left( a \tan [d+e x] + \sqrt{a+i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right) \right] / \right. \\
 & \left. \left( (a-i b-c) \sqrt{a+i b-c} (i+\tan [d+e x]) \right) \right) / (a+i b-c)^{3/2} \tan [d+e x]) / \\
 & \left( 4 \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \sqrt{c+b \tan [d+e x]+a \tan [d+e x]^2} \right) + \\
 & \frac{1}{2 \sqrt{c+b \tan [d+e x]+a \tan [d+e x]^2}} \\
 & \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \tan [d+e x] \\
 & \left( \left( (a+i b-c) (-i+\tan [d+e x]) \left( (-4 i a \sec [d+e x]^2-2 b \sec [d+e x]^2+ \right. \right. \right. \right. \\
 & \left. \left. \left. (2 i \sqrt{a-i b-c} (a \sec [d+e x]^2 \tan [d+e x]+ \sec [d+e x]^2 \right. \right. \right. \right. \\
 & \left. \left. \left. (b+a \tan [d+e x])) \right) \right) / \left( \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right) / \\
 & \left( \sqrt{a-i b-c} (a+i b-c) (-i+\tan [d+e x]) \right) - \left( \sec [d+e x]^2 \right. \\
 & \left. (-4 c-4 i a \tan [d+e x]-2 b (i+\tan [d+e x]) +4 i \sqrt{a-i b-c} \right. \\
 & \left. \left. \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right) / \left( \sqrt{a-i b-c} (a+i b-c) \right. \\
 & \left. \left. (-i+\tan [d+e x])^2 \right) \right) / \left( (a-i b-c) (-4 c-4 i a \tan [d+e x]-2 b \right. \right. \\
 & \left. \left. (i+\tan [d+e x]) +4 i \sqrt{a-i b-c} \sqrt{c+\tan [d+e x] (b+a \tan [d+e x])} \right) \right) -
 \end{aligned}$$

$$\left( (a - i b - c) (i + \tan[d + e x]) \left( \left( 2 b \sec[d + e x]^2 - 4 i \left( a \sec[d + e x]^2 + \sqrt{a + i b - c} \right. \right. \right. \right. \\ \left. \left. \left. \left( a \sec[d + e x]^2 \tan[d + e x] + \sec[d + e x]^2 (b + a \tan[d + e x]) \right) \right) \right) \right) / \\ \left( 2 \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \right) / \left( (a - i b - c) \sqrt{a + i b - c} \right. \\ \left. (i + \tan[d + e x]) \right) - \left( \sec[d + e x]^2 \left( 4 c + 2 b (-i + \tan[d + e x]) - \right. \right. \\ \left. \left. 4 i \left( a \tan[d + e x] + \sqrt{a + i b - c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \right) \right) / \\ \left( (a - i b - c) \sqrt{a + i b - c} (i + \tan[d + e x])^2 \right) \right) / \\ \left( (a + i b - c) \left( 4 c + 2 b (-i + \tan[d + e x]) - 4 i \left( a \tan[d + e x] + \right. \right. \right. \\ \left. \left. \sqrt{a + i b - c} \sqrt{c + \tan[d + e x] (b + a \tan[d + e x])} \right) \right) \right) \right)$$

Problem 14: Result unnecessarily involves complex numbers and more than twice size of optimal antiderivative.

$$\int \frac{\cot[d + e x]}{(a + b \cot[d + e x] + c \cot[d + e x]^2)^{3/2}} dx$$

Optimal (type 3, 635 leaves, 7 steps):

$$\begin{aligned}
 & - \left( \left( \sqrt{2 a - 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2}} \sqrt{a^2 - b^2 - 2 a c + c^2 + (a - c) \sqrt{a^2 + b^2 - 2 a c + c^2}} \operatorname{ArcTanh} \left[ \right. \right. \right. \\
 & \quad \left. \left. \left( b^2 - (a - c) \left( a - c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - b \left( 2 a - 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \operatorname{Cot} [d + e x] \right) \right] \right) / \\
 & \quad \left( \sqrt{2} \sqrt{2 a - 2 c - \sqrt{a^2 + b^2 - 2 a c + c^2}} \sqrt{a^2 - b^2 - 2 a c + c^2 + (a - c) \sqrt{a^2 + b^2 - 2 a c + c^2}} \right. \\
 & \quad \left. \sqrt{a + b \operatorname{Cot} [d + e x] + c \operatorname{Cot} [d + e x]^2} \right) \Bigg] / \left( \sqrt{2} (a^2 + b^2 - 2 a c + c^2)^{3/2} e \right) + \\
 & \left( \sqrt{2 a - 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2}} \sqrt{a^2 - b^2 - 2 a c + c^2 - (a - c) \sqrt{a^2 + b^2 - 2 a c + c^2}} \operatorname{ArcTanh} \left[ \right. \right. \\
 & \quad \left. \left. \left( b^2 - (a - c) \left( a - c - \sqrt{a^2 + b^2 - 2 a c + c^2} \right) - b \left( 2 a - 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2} \right) \operatorname{Cot} [d + e x] \right) \right] \right) / \\
 & \quad \left( \sqrt{2} \sqrt{2 a - 2 c + \sqrt{a^2 + b^2 - 2 a c + c^2}} \sqrt{a^2 - b^2 - 2 a c + c^2 - (a - c) \sqrt{a^2 + b^2 - 2 a c + c^2}} \right. \\
 & \quad \left. \sqrt{a + b \operatorname{Cot} [d + e x] + c \operatorname{Cot} [d + e x]^2} \right) \Bigg] / \left( \sqrt{2} (a^2 + b^2 - 2 a c + c^2)^{3/2} e \right) - \\
 & \frac{2 (a (b^2 - 2 (a - c) c) + b c (a + c) \operatorname{Cot} [d + e x])}{(b^2 + (a - c)^2) (b^2 - 4 a c) e \sqrt{a + b \operatorname{Cot} [d + e x] + c \operatorname{Cot} [d + e x]^2}}
 \end{aligned}$$

Result(type 3, 3075 leaves):

$$\begin{aligned}
 & \frac{1}{e} \sqrt{\frac{-a - c + a \operatorname{Cos} [2 (d + e x)] - c \operatorname{Cos} [2 (d + e x)] - b \operatorname{Sin} [2 (d + e x)]}{-1 + \operatorname{Cos} [2 (d + e x)]}} \\
 & \left( - \frac{2 a (-b^2 + 2 a c - 2 c^2)}{(a - c) (a - i b - c) (a + i b - c) (-b^2 + 4 a c)} - \right. \\
 & \quad \left. \frac{(2 (-2 a b^2 c + 4 a^2 c^2 - 4 a c^3 - a b^3 \operatorname{Sin} [2 (d + e x)] + 3 a^2 b c \operatorname{Sin} [2 (d + e x)] - 2 a b c^2 \operatorname{Sin} [2 (d + e x)] - b c^3 \operatorname{Sin} [2 (d + e x)]))}{(a - c) (a - i b - c) (a + i b - c)} \right) / \\
 & \quad \left( (-b^2 + 4 a c) (-a - c + a \operatorname{Cos} [2 (d + e x)] - c \operatorname{Cos} [2 (d + e x)] - b \operatorname{Sin} [2 (d + e x)]) \right) \Bigg] + \\
 & \left( \sqrt{a + b \operatorname{Cot} [d + e x] + c \operatorname{Cot} [d + e x]^2} \left( - \frac{1}{(a - i b - c)^{3/2}} \operatorname{Log} \left[ \left( -4 c - 4 i a \operatorname{Tan} [d + e x] - \right. \right. \right. \right. \\
 & \quad \left. \left. \left. 2 b (i + \operatorname{Tan} [d + e x]) + 4 i \sqrt{a - i b - c} \sqrt{c + \operatorname{Tan} [d + e x] (b + a \operatorname{Tan} [d + e x])} \right) \right] \right) / \\
 & \quad \left( \sqrt{a - i b - c} (a + i b - c) (-i + \operatorname{Tan} [d + e x]) \right) \Bigg] + \\
 & \frac{1}{(a + i b - c)^{3/2}} \operatorname{Log} \left[ \left( 4 c + 2 b (-i + \operatorname{Tan} [d + e x]) - \right. \right.
 \end{aligned}$$

$$\begin{aligned}
 & 4i \left( a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c+\tan[d+ex]} (b+a \tan[d+ex]) \right) / \\
 & \left( (a-ib-c) \sqrt{a+ib-c} (i+\tan[d+ex]) \right) \\
 & \left( - \left( \left( b \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \right.} \right. \right. \right. \\
 & \left. \left. \left. \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c)(a+ib-c)) \right. \\
 & \left. (-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) \right) + \\
 & \left( b \cos[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right.} \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c) \\
 & c)(a+ib-c)(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) - \\
 & \left( a \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right.} \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / ((a-ib-c) \\
 & c)(a+ib-c)(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - b \sin[2(d+ex)]) + \\
 & \left( c \sin[2(d+ex)] \sqrt{\left( -\frac{a}{-1+\cos[2(d+ex)]} - \frac{c}{-1+\cos[2(d+ex)]} + \right.} \right. \\
 & \left. \left. \frac{a \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{c \cos[2(d+ex)]}{-1+\cos[2(d+ex)]} - \frac{b \sin[2(d+ex)]}{-1+\cos[2(d+ex)]} \right) \right) / \\
 & ((a-ib-c)(a+ib-c)(-a-c+a \cos[2(d+ex)] - c \cos[2(d+ex)] - \\
 & b \sin[2(d+ex)])) \tan[d+ex] \Big) / \\
 & \left( 2e \sqrt{c+b \tan[d+ex]+a \tan[d+ex]^2} \left( - \left( \left( \sqrt{a+b \cot[d+ex]+c \cot[d+ex]^2} \right. \right. \right. \right. \\
 & \left. \left. \left( - \left( \log \left[ \left( -4c-4ia \tan[d+ex]-2b(i+\tan[d+ex])+4i\sqrt{a-ib-c} \right. \right. \right. \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c+\tan[d+ex]} (b+a \tan[d+ex]) \right) \right) / \left( \sqrt{a-ib-c} (a+ib-c) \right. \right. \right. \\
 & \left. \left. \left. (-i+\tan[d+ex]) \right) \right) / (a-ib-c)^{3/2} \right) + \log \left[ \left( 4c+2b(-i+\tan[d+ex]) - \right. \right. \\
 & \left. \left. 4i \left( a \tan[d+ex] + \sqrt{a+ib-c} \sqrt{c+\tan[d+ex]} (b+a \tan[d+ex]) \right) \right) \right) / \\
 & \left( (a-ib-c) \sqrt{a+ib-c} (i+\tan[d+ex]) \right) \Big) / (a+ib-c)^{3/2} \\
 & \tan[d+ex] (b \sec[d+ex]^2 + 2a \sec[d+ex]^2 \tan[d+ex]) \Big) /
 \end{aligned}$$

$$\begin{aligned}
 & \left( 4 \left( c + b \tan [d + e x] + a \tan [d + e x]^2 \right)^{3/2} \right) + \left( \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \right. \\
 & \left. - \left( \log \left[ \left( -4 c - 4 i a \tan [d + e x] - 2 b (i + \tan [d + e x]) + 4 i \sqrt{a - i b - c} \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right] / \left( \sqrt{a - i b - c} (a + i b - c) \right. \right. \\
 & \quad \left. \left. (-i + \tan [d + e x]) \right) \right) / (a - i b - c)^{3/2} + \log \left[ \left( 4 c + 2 b (-i + \tan [d + e x]) - \right. \right. \\
 & \quad \left. \left. 4 i \left( a \tan [d + e x] + \sqrt{a + i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \\
 & \quad \left( (a - i b - c) \sqrt{a + i b - c} (i + \tan [d + e x]) \right) / (a + i b - c)^{3/2} \sec [d + e x]^2 \Big/ \\
 & \left( 2 \sqrt{c + b \tan [d + e x] + a \tan [d + e x]^2} \right) + \left( (-b \csc [d + e x]^2 - 2 c \cot [d + e x] \csc [d + e x]^2) \right. \\
 & \left. - \left( \log \left[ \left( -4 c - 4 i a \tan [d + e x] - 2 b (i + \tan [d + e x]) + 4 i \sqrt{a - i b - c} \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right] / \left( \sqrt{a - i b - c} (a + i b - c) \right. \right. \right. \\
 & \quad \left. \left. (-i + \tan [d + e x]) \right) \right) / (a - i b - c)^{3/2} + \log \left[ \left( 4 c + 2 b (-i + \tan [d + e x]) - \right. \right. \\
 & \quad \left. \left. 4 i \left( a \tan [d + e x] + \sqrt{a + i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \right] / \\
 & \quad \left( (a - i b - c) \sqrt{a + i b - c} (i + \tan [d + e x]) \right) / (a + i b - c)^{3/2} \tan [d + e x] \Big/ \\
 & \left( 4 \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \sqrt{c + b \tan [d + e x] + a \tan [d + e x]^2} \right) + \\
 & \quad \frac{1}{2 \sqrt{c + b \tan [d + e x] + a \tan [d + e x]^2}} \\
 & \quad \sqrt{a + b \cot [d + e x] + c \cot [d + e x]^2} \tan [d + e x] \\
 & \quad \left( - \left( \left( (a + i b - c) (-i + \tan [d + e x]) \left( \left( -4 i a \sec [d + e x]^2 - 2 b \sec [d + e x]^2 + \right. \right. \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \left( 2 i \sqrt{a - i b - c} (a \sec [d + e x]^2 \tan [d + e x] + \sec [d + e x]^2 \right. \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (b + a \tan [d + e x]) \right) \right) \right] / \left( \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \Big/ \\
 & \quad \left( \sqrt{a - i b - c} (a + i b - c) (-i + \tan [d + e x]) \right) - \left( \sec [d + e x]^2 \right. \\
 & \quad \left. \left( -4 c - 4 i a \tan [d + e x] - 2 b (i + \tan [d + e x]) + 4 i \sqrt{a - i b - c} \right. \right. \\
 & \quad \left. \left. \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) / \left( \sqrt{a - i b - c} (a + i b - c) \right. \\
 & \quad \left. (-i + \tan [d + e x])^2 \right) \Big/ \left( (a - i b - c) \left( -4 c - 4 i a \tan [d + e x] - 2 b \right. \right. \\
 & \quad \left. \left. (i + \tan [d + e x]) + 4 i \sqrt{a - i b - c} \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \right) \Big/ \\
 & \quad \left( (a - i b - c) (i + \tan [d + e x]) \left( \left( 2 b \sec [d + e x]^2 - 4 i \left( a \sec [d + e x]^2 + \left( \sqrt{a + i b - c} \right. \right. \right. \right. \right. \right. \\
 & \quad \left. \left. \left. (a \sec [d + e x]^2 \tan [d + e x] + \sec [d + e x]^2 (b + a \tan [d + e x]) \right) \right) \right) \Big/ \\
 & \quad \left( 2 \sqrt{c + \tan [d + e x] (b + a \tan [d + e x])} \right) \Big/ \left( (a - i b - c) \sqrt{a + i b - c} \right)
 \end{aligned}$$

$$\left( (\text{I} + \text{Tan}[d + e x]) \right) - \left( \text{Sec}[d + e x]^2 \left( 4 c + 2 b (-\text{I} + \text{Tan}[d + e x]) - \right. \right. \\ \left. \left. 4 \text{I} \left( a \text{Tan}[d + e x] + \sqrt{a + \text{I} b - c} \sqrt{c + \text{Tan}[d + e x] (b + a \text{Tan}[d + e x])} \right) \right) \right) / \\ \left( (a - \text{I} b - c) \sqrt{a + \text{I} b - c} (\text{I} + \text{Tan}[d + e x])^2 \right) / \\ \left( (a + \text{I} b - c) \left( 4 c + 2 b (-\text{I} + \text{Tan}[d + e x]) - 4 \text{I} \left( a \text{Tan}[d + e x] + \right. \right. \right. \\ \left. \left. \left. \sqrt{a + \text{I} b - c} \sqrt{c + \text{Tan}[d + e x] (b + a \text{Tan}[d + e x])} \right) \right) \right) \right)$$

**Problem 15: Humongous result has more than 200000 leaves.**

$$\int \frac{\text{Tan}[d + e x]}{(a + b \text{Cot}[d + e x] + c \text{Cot}[d + e x]^2)^{3/2}} dx$$

Optimal (type 3, 749 leaves, 13 steps):

$$\frac{\text{ArcTanh}\left[\frac{2 a+b \cot [d+e x]}{2 \sqrt{a} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{a^{3/2} e} +$$

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

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

$$\frac{2\left(b^2-2 a c+b c \cot [d+e x]\right)}{a\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} +$$

$$\frac{2\left(a\left(b^2-2(a-c) c\right)+b c(a+c) \cot [d+e x]\right)}{\left(b^2+(a-c)^2\right)\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}$$

Result (type ?, 558961 leaves): Display of huge result suppressed!

**Problem 16: Humongous result has more than 200000 leaves.**

$$\int \frac{\text{Tan}[d+e x]^3}{\left(a+b \cot [d+e x]+c \cot [d+e x]^2\right)^{3/2}} dx$$

Optimal (type 3, 1008 leaves, 18 steps):



$$\begin{aligned}
 & \frac{\text{ArcTanh}\left[\frac{2 a+b \cot [d+e x]}{2 \sqrt{a} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{a^{3 / 2} e} + \frac{3\left(5 b^2-4 a c\right) \text{ArcTanh}\left[\frac{2 a+b \cot [d+e x]}{2 \sqrt{a} \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}}\right]}{8 a^{7 / 2} e} \\
 & \left(\sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2}+(a-c) \sqrt{a^2+b^2-2 a c+c^2} \text{ArcTanh}\left[\frac{\left(b^2-(a-c)\left(a-c+\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right)}{\left(\sqrt{2} \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2}+(a-c) \sqrt{a^2+b^2-2 a c+c^2}\right)}\right]\right) / \\
 & \left(\sqrt{2} \sqrt{2 a-2 c-\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2}+(a-c) \sqrt{a^2+b^2-2 a c+c^2}\right) / \\
 & \left(\sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right) / \left(\sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3 / 2} e\right)+ \\
 & \left(\sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2}-(a-c) \sqrt{a^2+b^2-2 a c+c^2} \text{ArcTanh}\left[\frac{\left(b^2-(a-c)\left(a-c-\sqrt{a^2+b^2-2 a c+c^2}\right)-b\left(2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}\right) \cot [d+e x]\right)}{\left(\sqrt{2} \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2}-(a-c) \sqrt{a^2+b^2-2 a c+c^2}\right)}\right]\right) / \\
 & \left(\sqrt{2} \sqrt{2 a-2 c+\sqrt{a^2+b^2-2 a c+c^2}} \sqrt{a^2-b^2-2 a c+c^2}-(a-c) \sqrt{a^2+b^2-2 a c+c^2}\right) / \\
 & \left(\sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}\right) / \left(\sqrt{2}\left(a^2+b^2-2 a c+c^2\right)^{3 / 2} e\right)+ \\
 & \frac{2\left(b^2-2 a c+b c \cot [d+e x]\right)}{a\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{2\left(a\left(b^2-2(a-c) c\right)+b c(a+c) \cot [d+e x]\right)}{\left(b^2+(a-c)^2\right)\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} - \\
 & \frac{b\left(15 b^2-52 a c\right) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \tan [d+e x]}{4 a^3\left(b^2-4 a c\right) e} - \\
 & \frac{2\left(b^2-2 a c+b c \cot [d+e x]\right) \tan [d+e x]^2}{a\left(b^2-4 a c\right) e \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2}} + \\
 & \frac{\left(5 b^2-12 a c\right) \sqrt{a+b \cot [d+e x]+c \cot [d+e x]^2} \tan [d+e x]^2}{2 a^2\left(b^2-4 a c\right) e}
 \end{aligned}$$

Result(type ?, 930953 leaves): Display of huge result suppressed!

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

$$\int \frac{\text{Cot}[d + e x]^5}{\sqrt{a + b \text{Cot}[d + e x]^2 + c \text{Cot}[d + e x]^4}} dx$$

Optimal (type 3, 182 leaves, 8 steps):

$$\frac{\text{ArcTanh}\left[\frac{2a - b + (b - 2c) \text{Cot}[d + e x]^2}{2\sqrt{a - b + c} \sqrt{a + b \text{Cot}[d + e x]^2 + c \text{Cot}[d + e x]^4}}\right]}{2\sqrt{a - b + c} e} + \frac{(b + 2c) \text{ArcTanh}\left[\frac{b + 2c \text{Cot}[d + e x]^2}{2\sqrt{c} \sqrt{a + b \text{Cot}[d + e x]^2 + c \text{Cot}[d + e x]^4}}\right] - \sqrt{a + b \text{Cot}[d + e x]^2 + c \text{Cot}[d + e x]^4}}{4c^{3/2} e} - \frac{\sqrt{a + b \text{Cot}[d + e x]^2 + c \text{Cot}[d + e x]^4}}{2ce}$$

Result (type 3, 2952 leaves):

$$\begin{aligned} & -\frac{1}{2ce} \left( \sqrt{\left( (3a + b + 3c - 4a \cos[2(d + ex)] + 4c \cos[2(d + ex)] + a \cos[4(d + ex)] - \right. \right. \\ & \quad \left. \left. b \cos[4(d + ex)] + c \cos[4(d + ex)]) \right) / (3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]) \right) - \\ & \left( \left( (b + 2c) \text{Log}[\text{Tan}[d + ex]^2] - \frac{2c^{3/2} \text{Log}[1 + \text{Tan}[d + ex]^2]}{\sqrt{a - b + c}} - \right. \right. \\ & \quad \left. \left. b \text{Log}[2c + b \text{Tan}[d + ex]^2 + 2\sqrt{c} \sqrt{c + b \text{Tan}[d + ex]^2 + a \text{Tan}[d + ex]^4}] - \right. \right. \\ & \quad \left. \left. 2c \text{Log}[2c + b \text{Tan}[d + ex]^2 + 2\sqrt{c} \sqrt{c + b \text{Tan}[d + ex]^2 + a \text{Tan}[d + ex]^4}] + \right. \right. \\ & \quad \left. \left. \frac{1}{\sqrt{a - b + c}} 2c^{3/2} \text{Log}[b(-1 + \text{Tan}[d + ex]^2)] + \right. \right. \\ & \quad \left. \left. 2 \left( c - a \text{Tan}[d + ex]^2 + \sqrt{a - b + c} \sqrt{c + b \text{Tan}[d + ex]^2 + a \text{Tan}[d + ex]^4} \right) \right) \right) \\ & \left( - \left( \left( 2 \sqrt{\left( \frac{3a}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \frac{b}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \right. \right. \right. \right. \\ & \quad \left. \left. \frac{3c}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} - \frac{4a \cos[2(d + ex)]}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \right. \right. \\ & \quad \left. \left. \frac{4c \cos[2(d + ex)]}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \frac{a \cos[4(d + ex)]}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} - \right. \right. \\ & \quad \left. \left. \frac{b \cos[4(d + ex)]}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \frac{c \cos[4(d + ex)]}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} \right) \right) \\ & \quad \left. \left. \sin[2(d + ex)] \right) \right) / (3a + b + 3c - 4a \cos[2(d + ex)] + 4c \cos[2(d + ex)] + \\ & \quad \left. \left. a \cos[4(d + ex)] - b \cos[4(d + ex)] + c \cos[4(d + ex)]) \right) - \right. \\ & \left. \left( 2b \sqrt{\left( \frac{3a}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \frac{b}{3 - 4 \cos[2(d + ex)] + \cos[4(d + ex)]} + \right. \right. \right. \right. \end{aligned}$$

$$\begin{aligned}
 & \left( \frac{3c}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \right. \\
 & \left. \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \right. \\
 & \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} \right) \\
 & \sin[2(d+ex)] \Big/ \left( c(3a+b+3c-4a\cos[2(d+ex)]+4c\cos[2(d+ex)]+ \right. \\
 & \left. a\cos[4(d+ex)]-b\cos[4(d+ex)]+c\cos[4(d+ex)]) \right) - \\
 & \left( \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \right. \right. \\
 & \left. \frac{3c}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \right. \\
 & \left. \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \right. \\
 & \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} \right) \\
 & \left. \sin[4(d+ex)] \Big/ (3a+b+3c-4a\cos[2(d+ex)]+4c\cos[2(d+ex)]+ \right. \\
 & \left. a\cos[4(d+ex)]-b\cos[4(d+ex)]+c\cos[4(d+ex)]) \right) \\
 & \tan[d+ex]^2 \sqrt{a+\cot[d+ex]^4(c+b\tan[d+ex]^2)} \Big/ \left( 4 \right. \\
 & c^{3/2} \\
 & e \\
 & \left. \sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4} \right. \\
 & \left. \frac{1}{8c^{3/2}(c+b\tan[d+ex]^2+a\tan[d+ex]^4)^{3/2}} \right. \\
 & \left. \left( (b+2c)\log[\tan[d+ex]^2] - \frac{2c^{3/2}\log[1+\tan[d+ex]^2]}{\sqrt{a-b+c}} - \right. \right. \\
 & b\log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] - \\
 & 2c\log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] + \\
 & \frac{1}{\sqrt{a-b+c}} 2c^{3/2}\log[b(-1+\tan[d+ex]^2)] + \\
 & \left. \left. 2(c-a\tan[d+ex]^2+\sqrt{a-b+c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}) \right) \right)
 \end{aligned}$$

$$\begin{aligned}
 & \frac{\tan [d+e x]^2 \left(2 b \sec [d+e x]^2 \tan [d+e x]+4 a \sec [d+e x]^2 \tan [d+e x]^3\right)}{\sqrt{a+\cot [d+e x]^4\left(c+b \tan [d+e x]^2\right)}}-\frac{1}{2 c^{3 / 2} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}} \\
 & \left(\left(b+2 c\right) \log [\tan [d+e x]^2]-\frac{2 c^{3 / 2} \log [1+\tan [d+e x]^2]}{\sqrt{a-b+c}}-\right. \\
 & \quad b \log \left[2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right]- \\
 & \quad 2 c \log \left[2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right]+ \\
 & \quad \frac{1}{\sqrt{a-b+c}} 2 c^{3 / 2} \log [b(-1+\tan [d+e x]^2)+ \\
 & \quad \left.2\left(c-a \tan [d+e x]^2+\sqrt{a-b+c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)\right] \Big) \\
 & \frac{\sec [d+e x]^2 \tan [d+e x] \sqrt{a+\cot [d+e x]^4\left(c+b \tan [d+e x]^2\right)}}{\left(\left(b+2 c\right) \log [\tan [d+e x]^2]-\frac{2 c^{3 / 2} \log [1+\tan [d+e x]^2]}{\sqrt{a-b+c}}-\right. \\
 & \quad b \log \left[2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right]- \\
 & \quad 2 c \log \left[2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right]+ \\
 & \quad \frac{1}{\sqrt{a-b+c}} 2 c^{3 / 2} \log [b(-1+\tan [d+e x]^2)+2\left(c-a \tan [d+e x]^2+ \right. \\
 & \quad \left. \left.\sqrt{a-b+c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)\right] \Big) \tan [d+e x]^2 \\
 & \left.\left(2 b \cot [d+e x] \csc [d+e x]^2-4 \cot [d+e x]^3 \csc [d+e x]^2\left(c+b \tan [d+e x]^2\right)\right)\right) / \\
 & \left(\frac{8 c^{3 / 2} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4} \sqrt{a+\cot [d+e x]^4\left(c+b \tan [d+e x]^2\right)}}{1}-\right. \\
 & \left.\frac{4 c^{3 / 2} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}}{\tan [d+e x]^2 \sqrt{a+\cot [d+e x]^4\left(c+b \tan [d+e x]^2\right)}}\right. \\
 & \left.\left(2\left(b+2 c\right) \csc [d+e x] \sec [d+e x]-\frac{4 c^{3 / 2} \sec [d+e x]^2 \tan [d+e x]}{\sqrt{a-b+c}\left(1+\tan [d+e x]^2\right)}-\right. \right. \\
 & \quad \left.\left(b\left(2 b \sec [d+e x]^2 \tan [d+e x]+\left(\sqrt{c}\left(2 b \sec [d+e x]^2 \tan [d+e x]+4 a \sec [d+e x]^2\right.\right.\right.\right. \right. \\
 & \quad \left.\left.\left.\left.\tan [d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)\right)\right) / \\
 & \quad \left.\left(2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)-\right. \\
 & \quad \left.\left(2 c\left(2 b \sec [d+e x]^2 \tan [d+e x]+\left(\sqrt{c}\left(2 b \sec [d+e x]^2 \tan [d+e x]+4 a\right.\right.\right.\right. \right. \right. \\
 & \quad \left.\left.\left.\left.\sec [d+e x]^2 \tan [d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)\right)\right) /
 \end{aligned}$$

$$\begin{aligned} & \left( 2c + b \tan[d+ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4} \right) + \\ & \left( 2c^{3/2} \left( 2b \sec[d+ex]^2 \tan[d+ex] + 2 \left( -2a \sec[d+ex]^2 \tan[d+ex] + \right. \right. \right. \\ & \quad \left. \left. \left. \left( \sqrt{a-b+c} \left( 2b \sec[d+ex]^2 \tan[d+ex] + 4a \sec[d+ex]^2 \tan[d+ex]^3 \right) \right) \right) \right) \right) / \\ & \left( 2\sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4} \right) \Bigg) / \\ & \left( \sqrt{a-b+c} \left( b(-1 + \tan[d+ex]^2) + 2 \left( c - a \tan[d+ex]^2 + \sqrt{a-b+c} \right. \right. \right. \\ & \quad \left. \left. \left. \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4} \right) \right) \right) \Bigg) \Bigg) \end{aligned}$$

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

$$\int \frac{\cot[d+ex]^3}{\sqrt{a+b \cot[d+ex]^2 + c \cot[d+ex]^4}} dx$$

Optimal (type 3, 141 leaves, 7 steps):

$$\frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\cot[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{a-b+c}e} - \frac{\text{ArcTanh}\left[\frac{b+2c\cot[d+ex]^2}{2\sqrt{c}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{c}e}$$

Result (type 3, 2161 leaves):

$$\begin{aligned} & \left( \left( \frac{\text{Log}[\tan[d+ex]^2]}{\sqrt{c}} - \frac{\text{Log}[1+\tan[d+ex]^2]}{\sqrt{a-b+c}} - \frac{1}{\sqrt{c}} \right. \right. \\ & \quad \left. \left. \text{Log}\left[2c + b \tan[d+ex]^2 + 2\sqrt{c} \sqrt{c + \tan[d+ex]^2 (b + a \tan[d+ex]^2)}\right] + \right. \right. \\ & \quad \left. \left. \frac{1}{\sqrt{a-b+c}} \text{Log}\left[b(-1 + \tan[d+ex]^2) + \right. \right. \right. \\ & \quad \left. \left. \left. 2 \left( c - a \tan[d+ex]^2 + \sqrt{a-b+c} \sqrt{c + \tan[d+ex]^2 (b + a \tan[d+ex]^2)} \right) \right] \right) \right) \\ & \left( \left( 2 \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \right. \\ & \quad \frac{3c}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \\ & \quad \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \\ & \quad \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} \Bigg) \Bigg) \\ & \left. \sin[2(d+ex)] \right) / \left( 3a + b + 3c - 4a\cos[2(d+ex)] + 4c\cos[2(d+ex)] + \right. \end{aligned}$$

$$\begin{aligned}
 & \left( \sqrt{\left( \frac{a \cos[4(d+ex)] - b \cos[4(d+ex)] + c \cos[4(d+ex)]}{3a} + \frac{b}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \\
 & \left. \frac{3c}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} - \frac{4a \cos[2(d+ex)]}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \\
 & \left. \frac{4c \cos[2(d+ex)]}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{a \cos[4(d+ex)]}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} - \right. \\
 & \left. \frac{b \cos[4(d+ex)]}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{c \cos[4(d+ex)]}{3 - 4 \cos[2(d+ex)] + \cos[4(d+ex)]} \right) \\
 & \left. \sin[4(d+ex)] \right) / \left( (3a + b + 3c - 4a \cos[2(d+ex)] + 4c \cos[2(d+ex)] + \right. \\
 & \left. a \cos[4(d+ex)] - b \cos[4(d+ex)] + c \cos[4(d+ex)]) \right) \\
 & \tan[d+ex]^2 \sqrt{a + \cot[d+ex]^4 (c + b \tan[d+ex]^2)} \Big/ \left( 2 \right. \\
 & e \\
 & \left. \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4} \right. \\
 & \left( - \left( \left( \frac{\log[\tan[d+ex]^2]}{\sqrt{c}} - \frac{\log[1 + \tan[d+ex]^2]}{\sqrt{a-b+c}} - \frac{1}{\sqrt{c}} \log[2c + b \tan[d+ex]^2 + 2\sqrt{c}] \right. \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan[d+ex]^2 (b + a \tan[d+ex]^2)} \right) + \frac{1}{\sqrt{a-b+c}} \log[b(-1 + \tan[d+ex]^2)] + \right. \right. \\
 & \left. \left. 2 \left( c - a \tan[d+ex]^2 + \sqrt{a-b+c} \sqrt{c + \tan[d+ex]^2 (b + a \tan[d+ex]^2)} \right) \right) \right) \\
 & \tan[d+ex]^2 (2b \sec[d+ex]^2 \tan[d+ex] + 4a \sec[d+ex]^2 \tan[d+ex]^3) \\
 & \left. \sqrt{a + \cot[d+ex]^4 (c + b \tan[d+ex]^2)} \right) / \\
 & \left( 4 (c + b \tan[d+ex]^2 + a \tan[d+ex]^4)^{3/2} \right) + \\
 & \left( \left( \frac{\log[\tan[d+ex]^2]}{\sqrt{c}} - \frac{\log[1 + \tan[d+ex]^2]}{\sqrt{a-b+c}} - \frac{1}{\sqrt{c}} \log[2c + b \tan[d+ex]^2 + 2\sqrt{c}] \right. \right. \\
 & \left. \left. \left. \sqrt{c + \tan[d+ex]^2 (b + a \tan[d+ex]^2)} \right) + \frac{1}{\sqrt{a-b+c}} \log[b(-1 + \tan[d+ex]^2)] + \right. \right. \\
 & \left. \left. 2 \left( c - a \tan[d+ex]^2 + \sqrt{a-b+c} \sqrt{c + \tan[d+ex]^2 (b + a \tan[d+ex]^2)} \right) \right) \right) \\
 & \left. \sec[d+ex]^2 \tan[d+ex] \sqrt{a + \cot[d+ex]^4 (c + b \tan[d+ex]^2)} \right) /
 \end{aligned}$$

$$\begin{aligned}
 & \left( \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4} \right) + \\
 & \left( \left( \frac{\log [\tan [d + e x]^2]}{\sqrt{c}} - \frac{\log [1 + \tan [d + e x]^2]}{\sqrt{a - b + c}} - \frac{1}{\sqrt{c}} \right. \right. \\
 & \quad \left. \left. \log \left[ 2 c + b \tan [d + e x]^2 + 2 \sqrt{c} \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)} \right] + \right. \right. \\
 & \quad \left. \left. \frac{1}{\sqrt{a - b + c}} \log [b (-1 + \tan [d + e x]^2) + 2 (c - a \tan [d + e x]^2 + \sqrt{a - b + c} \right. \right. \\
 & \quad \left. \left. \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)} \right] \right) \tan [d + e x]^2 \\
 & \left. \left( 2 b \cot [d + e x] \operatorname{Csc} [d + e x]^2 - 4 \cot [d + e x]^3 \operatorname{Csc} [d + e x]^2 (c + b \tan [d + e x]^2) \right) \right) / \\
 & \left( 4 \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4} \sqrt{a + \cot [d + e x]^4 (c + b \tan [d + e x]^2)} \right) + \\
 & \frac{1}{2 \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4}} \\
 & \tan [d + e x]^2 \sqrt{a + \cot [d + e x]^4 (c + b \tan [d + e x]^2)} \\
 & \left( \frac{2 \operatorname{Csc} [d + e x] \operatorname{Sec} [d + e x]}{\sqrt{c}} - \frac{2 \operatorname{Sec} [d + e x]^2 \tan [d + e x]}{\sqrt{a - b + c} (1 + \tan [d + e x]^2)} - \left( 2 b \operatorname{Sec} [d + e x]^2 \right. \right. \\
 & \quad \left. \left. \tan [d + e x] + \left( \sqrt{c} (2 a \operatorname{Sec} [d + e x]^2 \tan [d + e x]^3 + 2 \operatorname{Sec} [d + e x]^2 \tan [d + e x] \right. \right. \right. \\
 & \quad \left. \left. \left. (b + a \tan [d + e x]^2) \right) \right) \right) / \left( \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)} \right) \right) / \\
 & \left( \sqrt{c} (2 c + b \tan [d + e x]^2 + 2 \sqrt{c} \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)}) \right) + \\
 & \left( 2 b \operatorname{Sec} [d + e x]^2 \tan [d + e x] + 2 \left( -2 a \operatorname{Sec} [d + e x]^2 \tan [d + e x] + \right. \right. \\
 & \quad \left. \left. \left( \sqrt{a - b + c} (2 a \operatorname{Sec} [d + e x]^2 \tan [d + e x]^3 + 2 \operatorname{Sec} [d + e x]^2 \tan [d + e x] \right. \right. \right. \\
 & \quad \left. \left. \left. (b + a \tan [d + e x]^2) \right) \right) \right) / \left( 2 \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)} \right) \right) \right) / \\
 & \left( \sqrt{a - b + c} (b (-1 + \tan [d + e x]^2) + 2 (c - a \tan [d + e x]^2 + \sqrt{a - b + c} \right. \\
 & \quad \left. \left. \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)} \right) \right) \right) \right) \right) \right) \right) \right)
 \end{aligned}$$

**Problem 19: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\cot [d + e x]}{\sqrt{a + b \cot [d + e x]^2 + c \cot [d + e x]^4}} dx$$

Optimal (type 3, 79 leaves, 4 steps):

$$\frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\cot[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{a-b+c}e}$$

Result (type 4, 84 039 leaves): Display of huge result suppressed!

**Problem 20: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Tan}[d+ex]}{\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}} dx$$

Optimal (type 3, 142 leaves, 8 steps):

$$\frac{\text{ArcTanh}\left[\frac{2a+b\cot[d+ex]^2}{2\sqrt{a}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{a}e} - \frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\cot[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{a-b+c}e}$$

Result (type 4, 44 361 leaves): Display of huge result suppressed!

**Problem 21: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Tan}[d+ex]^3}{\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}} dx$$

Optimal (type 3, 249 leaves, 11 steps):

$$-\frac{\text{ArcTanh}\left[\frac{2a+b\cot[d+ex]^2}{2\sqrt{a}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{a}e} - \frac{b\text{ArcTanh}\left[\frac{2a+b\cot[d+ex]^2}{2\sqrt{a}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{4a^{3/2}e} + \frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\cot[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}}\right]}{2\sqrt{a-b+c}e} + \frac{\sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4}\text{Tan}[d+ex]^2}{2ae}$$

Result (type 4, 124 484 leaves): Display of huge result suppressed!

**Problem 22: Result more than twice size of optimal antiderivative.**

$$\int \cot[d+ex]^5 \sqrt{a+b\cot[d+ex]^2+c\cot[d+ex]^4} dx$$

Optimal (type 3, 270 leaves, 9 steps):



$$\frac{\sqrt{a-b+c} \operatorname{ArcTanh}\left[\frac{2a-b+(b-2c)\operatorname{Cot}[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\operatorname{Cot}[d+ex]^2+c\operatorname{Cot}[d+ex]^4}}\right]}{2e} - \frac{1}{32c^{5/2}e}$$

$$\frac{(b^3+2b^2c-4b(a-2c)c-8c^2(a+2c))\operatorname{ArcTanh}\left[\frac{b+2c\operatorname{Cot}[d+ex]^2}{2\sqrt{c}\sqrt{a+b\operatorname{Cot}[d+ex]^2+c\operatorname{Cot}[d+ex]^4}}\right]}{2\sqrt{c}\sqrt{a+b\operatorname{Cot}[d+ex]^2+c\operatorname{Cot}[d+ex]^4}} +$$

$$\frac{1}{16c^2e} \left( (b-2c)(b+4c)+2c(b+2c)\operatorname{Cot}[d+ex]^2 \right) \sqrt{a+b\operatorname{Cot}[d+ex]^2+c\operatorname{Cot}[d+ex]^4} -$$

$$\frac{(a+b\operatorname{Cot}[d+ex]^2+c\operatorname{Cot}[d+ex]^4)^{3/2}}{6ce}$$

Result (type 3, 4238 leaves):

$$\frac{1}{e} \sqrt{(3a+b+3c-4a\cos[2(d+ex)]+4c\cos[2(d+ex)]+a\cos[4(d+ex)] -$$

$$b\cos[4(d+ex)]+c\cos[4(d+ex)]) / (3-4\cos[2(d+ex)]+\cos[4(d+ex)])}$$

$$\left( -\frac{3b^2+8ac-8bc+44c^2}{48c^2} + \frac{(-b+14c)\operatorname{Csc}[d+ex]^2}{24c} - \frac{1}{6}\operatorname{Csc}[d+ex]^4 \right) +$$

$$\left( (b^3+2b^2c-4b(a-2c)c-8c^2(a+2c))\operatorname{Log}[\operatorname{Tan}[d+ex]^2] +$$

$$16c^{5/2}\sqrt{a-b+c}\operatorname{Log}[1+\operatorname{Tan}[d+ex]^2] - (b^3+2b^2c-4b(a-2c)c-8c^2(a+2c))$$

$$\operatorname{Log}[2c+b\operatorname{Tan}[d+ex]^2+2\sqrt{c}\sqrt{c+\operatorname{Tan}[d+ex]^2}(b+a\operatorname{Tan}[d+ex]^2)] -$$

$$16c^{5/2}\sqrt{a-b+c}\operatorname{Log}[b(-1+\operatorname{Tan}[d+ex]^2) +$$

$$2(c-a\operatorname{Tan}[d+ex]^2+\sqrt{a-b+c}\sqrt{c+\operatorname{Tan}[d+ex]^2}(b+a\operatorname{Tan}[d+ex]^2))] \right)$$

$$\left( b^3 \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} +$$

$$\frac{3c}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} +$$

$$\frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} -$$

$$\frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} \right)$$

$$\operatorname{Sin}[2(d+ex)] \Bigg) / (4c^2(3a+b+3c-4a\cos[2(d+ex)]+4c\cos[2(d+ex)] +$$

$$a\cos[4(d+ex)] - b\cos[4(d+ex)] + c\cos[4(d+ex)])) -$$

$$\left( ab \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} +$$

$$\frac{3c}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} +$$

$$\frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} -$$

$$\frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} \right)$$

$$\begin{aligned}
 & \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \sin [2 (d+e x)] \Big/ \left( c(3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+\right. \\
 & \left. a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)])\right)+ \\
 & \left( b^2 \sqrt{\left( \frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\right. \right. \\
 & \left. \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\right. \\
 & \left. \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\right. \\
 & \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \left. \sin [2 (d+e x)] \Big/ \left( 2 c(3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+\right. \right. \\
 & \left. \left. a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)])\right)-\right. \\
 & \left( 2 c \sqrt{\left( \frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\right. \right. \\
 & \left. \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\right. \\
 & \left. \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\right. \\
 & \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \left. \sin [2 (d+e x)] \Big/ \left( 3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+\right. \right. \\
 & \left. \left. a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)]\right)-\right. \\
 & \left( a \sqrt{\left( \frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\right. \right. \\
 & \left. \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\right. \\
 & \left. \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\right. \\
 & \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \left. \sin [4 (d+e x)] \Big/ \left( 3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+\right. \right. \\
 & \left. \left. a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)]\right)
 \end{aligned}$$

$$\begin{aligned}
 & a \cos [4 (d+e x)] - b \cos [4 (d+e x)] + c \cos [4 (d+e x)] + \\
 & \left( b \sqrt{\left( \frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \right. \right. \\
 & \quad \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} - \frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \\
 & \quad \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} - \\
 & \quad \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} \right) \\
 & \sin [4 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)] + \\
 & a \cos [4 (d+e x)] - b \cos [4 (d+e x)] + c \cos [4 (d+e x)] - \\
 & \left( c \sqrt{\left( \frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \right. \right. \\
 & \quad \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} - \frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \\
 & \quad \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} - \\
 & \quad \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} \right) \\
 & \sin [4 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)] + \\
 & a \cos [4 (d+e x)] - b \cos [4 (d+e x)] + c \cos [4 (d+e x)] \Big) \\
 & \tan [d+e x]^2 \sqrt{a+\cot [d+e x]^4 (c+b \tan [d+e x]^2)} \Big/ \left( 32 \right. \\
 & c^{5/2} \\
 & e \\
 & \left. \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4} \right. \\
 & \left( -\frac{1}{64 c^{5/2} (c+b \tan [d+e x]^2+a \tan [d+e x]^4)^{3/2}} \right. \\
 & \quad \left( (b^3+2 b^2 c-4 b (a-2 c) c-8 c^2 (a+2 c)) \log [\tan [d+e x]^2] + \right. \\
 & \quad 16 c^{5/2} \sqrt{a-b+c} \log [1+\tan [d+e x]^2] - (b^3+2 b^2 c-4 b (a-2 c) c-8 c^2 (a+2 c)) \\
 & \quad \log [2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+\tan [d+e x]^2 (b+a \tan [d+e x]^2)}] - \\
 & \quad 16 c^{5/2} \sqrt{a-b+c} \log [b (-1+\tan [d+e x]^2) + \\
 & \quad \left. \left. 2 (c-a \tan [d+e x]^2+\sqrt{a-b+c} \sqrt{c+\tan [d+e x]^2 (b+a \tan [d+e x]^2)}) \right) \right] \Big)
 \end{aligned}$$

$$\begin{aligned}
& \frac{\text{Tan}[d+ex]^2 (2b \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + 4a \text{Sec}[d+ex]^2 \text{Tan}[d+ex]^3)}{\sqrt{a+\text{Cot}[d+ex]^4 (c+b \text{Tan}[d+ex]^2)} + \frac{1}{16c^{5/2} \sqrt{c+b \text{Tan}[d+ex]^2 + a \text{Tan}[d+ex]^4}}} \\
& \left( (b^3 + 2b^2c - 4b(a-2c)c - 8c^2(a+2c)) \text{Log}[\text{Tan}[d+ex]^2] + \right. \\
& \quad 16c^{5/2} \sqrt{a-b+c} \text{Log}[1+\text{Tan}[d+ex]^2] - (b^3 + 2b^2c - 4b(a-2c)c - 8c^2(a+2c)) \\
& \quad \text{Log}[2c+b \text{Tan}[d+ex]^2 + 2\sqrt{c} \sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)}] - \\
& \quad 16c^{5/2} \sqrt{a-b+c} \text{Log}[b(-1+\text{Tan}[d+ex]^2) + \\
& \quad \left. 2(c-a \text{Tan}[d+ex]^2 + \sqrt{a-b+c} \sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)})] \right) \\
& \text{Sec}[d+ex]^2 \text{Tan}[d+ex] \sqrt{a+\text{Cot}[d+ex]^4 (c+b \text{Tan}[d+ex]^2)} + \\
& \left( (b^3 + 2b^2c - 4b(a-2c)c - 8c^2(a+2c)) \text{Log}[\text{Tan}[d+ex]^2] + \right. \\
& \quad 16c^{5/2} \sqrt{a-b+c} \text{Log}[1+\text{Tan}[d+ex]^2] - (b^3 + 2b^2c - 4b(a-2c)c - 8c^2(a+2c)) \\
& \quad \text{Log}[2c+b \text{Tan}[d+ex]^2 + 2\sqrt{c} \sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)}] - \\
& \quad 16c^{5/2} \sqrt{a-b+c} \text{Log}[b(-1+\text{Tan}[d+ex]^2) + 2(c-a \text{Tan}[d+ex]^2 + \\
& \quad \left. \sqrt{a-b+c} \sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)})] \right) \text{Tan}[d+ex]^2 \\
& \left( 2b \text{Cot}[d+ex] \text{Csc}[d+ex]^2 - 4 \text{Cot}[d+ex]^3 \text{Csc}[d+ex]^2 (c+b \text{Tan}[d+ex]^2) \right) \Big/ \\
& \left( 64c^{5/2} \sqrt{c+b \text{Tan}[d+ex]^2 + a \text{Tan}[d+ex]^4} \sqrt{a+\text{Cot}[d+ex]^4 (c+b \text{Tan}[d+ex]^2)} + \right. \\
& \quad \left. \frac{1}{32c^{5/2} \sqrt{c+b \text{Tan}[d+ex]^2 + a \text{Tan}[d+ex]^4}} \right. \\
& \quad \left. \frac{\text{Tan}[d+ex]^2 \sqrt{a+\text{Cot}[d+ex]^4 (c+b \text{Tan}[d+ex]^2)}}{1+\text{Tan}[d+ex]^2} - \right. \\
& \quad \left( 2(b^3 + 2b^2c - 4b(a-2c)c - 8c^2(a+2c)) \text{Csc}[d+ex] \text{Sec}[d+ex] + \right. \\
& \quad \left. \frac{32c^{5/2} \sqrt{a-b+c} \text{Sec}[d+ex]^2 \text{Tan}[d+ex]}{1+\text{Tan}[d+ex]^2} - \right. \\
& \quad \left( (b^3 + 2b^2c - 4b(a-2c)c - 8c^2(a+2c)) (2b \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + \right. \\
& \quad \left. (\sqrt{c} (2a \text{Sec}[d+ex]^2 \text{Tan}[d+ex]^3 + 2 \text{Sec}[d+ex]^2 \text{Tan}[d+ex] \right. \\
& \quad \left. (b+a \text{Tan}[d+ex]^2))) \Big/ (\sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)}) \right) \Big/ \\
& \quad \left( 2c+b \text{Tan}[d+ex]^2 + 2\sqrt{c} \sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)} \right) - \\
& \quad \left( 16c^{5/2} \sqrt{a-b+c} (2b \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + 2 \right. \\
& \quad \left. (-2a \text{Sec}[d+ex]^2 \text{Tan}[d+ex] + (\sqrt{a-b+c} (2a \text{Sec}[d+ex]^2 \text{Tan}[d+ex]^3 + \right. \\
& \quad \left. 2 \text{Sec}[d+ex]^2 \text{Tan}[d+ex] (b+a \text{Tan}[d+ex]^2))) \Big/ \right. \\
& \quad \left. \left( 2\sqrt{c+\text{Tan}[d+ex]^2 (b+a \text{Tan}[d+ex]^2)} \right) \right) \Big/ (b(-1+\text{Tan}[d+ex]^2) +
\end{aligned}$$

$$2 \left( c - a \tan [d + e x]^2 + \sqrt{a - b + c} \sqrt{c + \tan [d + e x]^2 (b + a \tan [d + e x]^2)} \right) \Bigg) \Bigg) \Bigg) \Bigg)$$

**Problem 23: Result more than twice size of optimal antiderivative.**

$$\int \cot [d + e x]^3 \sqrt{a + b \cot [d + e x]^2 + c \cot [d + e x]^4} dx$$

Optimal (type 3, 209 leaves, 8 steps):

$$\frac{\sqrt{a - b + c} \operatorname{ArcTanh} \left[ \frac{2 a - b + (b - 2 c) \cot [d + e x]^2}{2 \sqrt{a - b + c} \sqrt{a + b \cot [d + e x]^2 + c \cot [d + e x]^4}} \right]}{2 e} +$$

$$\frac{(b^2 + 4 b c - 4 c (a + 2 c)) \operatorname{ArcTanh} \left[ \frac{b + 2 c \cot [d + e x]^2}{2 \sqrt{c} \sqrt{a + b \cot [d + e x]^2 + c \cot [d + e x]^4}} \right]}{16 c^{3/2} e} -$$

$$\frac{(b - 4 c + 2 c \cot [d + e x]^2) \sqrt{a + b \cot [d + e x]^2 + c \cot [d + e x]^4}}{8 c e}$$

Result (type 3, 4379 leaves):

$$\frac{1}{e} \sqrt{\left( (3 a + b + 3 c - 4 a \cos [2 (d + e x)]) + \right.}$$

$$\left. 4 c \cos [2 (d + e x)] + a \cos [4 (d + e x)] - b \cos [4 (d + e x)] + c \cos [4 (d + e x)] \right) /$$

$$\left( 3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)] \right) \left( \frac{-b + 6 c}{8 c} - \frac{1}{4} \operatorname{Csc} [d + e x]^2 \right) +$$

$$\left( \left( - (b^2 + 4 b c - 4 c (a + 2 c)) \log [\tan [d + e x]^2] - 8 c^{3/2} \sqrt{a - b + c} \log [1 + \tan [d + e x]^2] + \right. \right.$$

$$b^2 \log [2 c + b \tan [d + e x]^2 + 2 \sqrt{c} \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4}] -$$

$$4 a c \log [2 c + b \tan [d + e x]^2 + 2 \sqrt{c} \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4}] +$$

$$4 b c \log [2 c + b \tan [d + e x]^2 + 2 \sqrt{c} \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4}] -$$

$$8 c^2 \log [2 c + b \tan [d + e x]^2 + 2 \sqrt{c} \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4}] +$$

$$8 c^{3/2} \sqrt{a - b + c} \log [b (-1 + \tan [d + e x]^2) +$$

$$\left. \left. 2 \left( c - a \tan [d + e x]^2 + \sqrt{a - b + c} \sqrt{c + b \tan [d + e x]^2 + a \tan [d + e x]^4} \right) \right) \right)$$

$$\left( - \left( \left( b^2 \sqrt{\left( \frac{3 a}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} + \frac{b}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} + \right. \right. \right. \right.$$

$$\frac{3 c}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} - \frac{4 a \cos [2 (d + e x)]}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} +$$

$$\frac{4 c \cos [2 (d + e x)]}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} + \frac{a \cos [4 (d + e x)]}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} -$$

$$\frac{b \cos [4 (d + e x)]}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} + \frac{c \cos [4 (d + e x)]}{3 - 4 \cos [2 (d + e x)] + \cos [4 (d + e x)]} \right) \right)$$



$$\begin{aligned}
 & \left( c \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \right. \right. \\
 & \quad \frac{3c}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \\
 & \quad \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} - \\
 & \quad \left. \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)]+\cos[4(d+ex)]} \right) \right) \\
 & \quad \left. \sin[4(d+ex)] \right) / (3a+b+3c-4a\cos[2(d+ex)]+4c\cos[2(d+ex)]+ \\
 & \quad a\cos[4(d+ex)]-b\cos[4(d+ex)]+c\cos[4(d+ex)]) \\
 & \quad \left. \tan[d+ex]^2 \sqrt{a+\cot[d+ex]^4(c+b\tan[d+ex]^2)} \right) / \left( 16 \right. \\
 & \quad c^{3/2} \\
 & \quad e \\
 & \quad \left. \sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4} \right. \\
 & \quad \left. \left( -\frac{1}{32c^{3/2}(c+b\tan[d+ex]^2+a\tan[d+ex]^4)^{3/2}} \right. \right. \\
 & \quad \left. \left( -(b^2+4bc-4c(a+2c)) \log[\tan[d+ex]^2] - 8c^{3/2}\sqrt{a-b+c} \log[1+\tan[d+ex]^2] + \right. \right. \\
 & \quad b^2 \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] - \\
 & \quad 4ac \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] + \\
 & \quad 4bc \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] - \\
 & \quad 8c^2 \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] + \\
 & \quad 8c^{3/2}\sqrt{a-b+c} \log[b(-1+\tan[d+ex]^2)] + \\
 & \quad \left. \left. 2(c-a\tan[d+ex]^2+\sqrt{a-b+c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}) \right) \right) \\
 & \quad \tan[d+ex]^2 (2b \sec[d+ex]^2 \tan[d+ex] + 4a \sec[d+ex]^2 \tan[d+ex]^3) \\
 & \quad \sqrt{a+\cot[d+ex]^4(c+b\tan[d+ex]^2)} + \frac{1}{8c^{3/2}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}} \\
 & \quad \left( -(b^2+4bc-4c(a+2c)) \log[\tan[d+ex]^2] - 8c^{3/2}\sqrt{a-b+c} \log[1+\tan[d+ex]^2] + \right. \\
 & \quad b^2 \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] - \\
 & \quad 4ac \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] + \\
 & \quad 4bc \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] - \\
 & \quad \left. 8c^2 \log[2c+b\tan[d+ex]^2+2\sqrt{c}\sqrt{c+b\tan[d+ex]^2+a\tan[d+ex]^4}] + \right)
 \end{aligned}$$

$$\begin{aligned}
& 8 c^{3/2} \sqrt{a-b+c} \operatorname{Log}\left[b\left(-1+\operatorname{Tan}[d+e x]^2\right)+\right. \\
& \quad \left.2\left(c-a \operatorname{Tan}[d+e x]^2+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right] \\
& \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x] \sqrt{a+\operatorname{Cot}[d+e x]^4\left(c+b \operatorname{Tan}[d+e x]^2\right)}+ \\
& \left(\left(-\left(b^2+4 b c-4 c(a+2 c)\right) \operatorname{Log}\left[\operatorname{Tan}[d+e x]^2\right]-8 c^{3/2} \sqrt{a-b+c} \operatorname{Log}\left[1+\operatorname{Tan}[d+e x]^2\right]+\right.\right. \\
& \quad b^2 \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]- \\
& \quad 4 a c \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]+ \\
& \quad 4 b c \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]- \\
& \quad 8 c^2 \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]+ \\
& \quad \left.8 c^{3/2} \sqrt{a-b+c} \operatorname{Log}\left[b\left(-1+\operatorname{Tan}[d+e x]^2\right)+2\left(c-a \operatorname{Tan}[d+e x]^2+\right.\right. \\
& \quad \left.\left.\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right] \operatorname{Tan}[d+e x]^2 \\
& \quad \left.\left.\left(2 b \operatorname{Cot}[d+e x] \operatorname{Csc}[d+e x]^2-4 \operatorname{Cot}[d+e x]^3 \operatorname{Csc}[d+e x]^2\left(c+b \operatorname{Tan}[d+e x]^2\right)\right)\right)\right) / \\
& \left(32 c^{3/2} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \sqrt{a+\operatorname{Cot}[d+e x]^4\left(c+b \operatorname{Tan}[d+e x]^2\right)}\right)+ \\
& \quad \frac{1}{16 c^{3/2} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \\
& \quad \operatorname{Tan}[d+e x]^2 \sqrt{a+\operatorname{Cot}[d+e x]^4\left(c+b \operatorname{Tan}[d+e x]^2\right)} \\
& \quad \left(-2\left(b^2+4 b c-4 c(a+2 c)\right) \operatorname{Csc}[d+e x] \operatorname{Sec}[d+e x]-\right. \\
& \quad \left.\frac{16 c^{3/2} \sqrt{a-b+c} \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]}{1+\operatorname{Tan}[d+e x]^2}+\right. \\
& \quad \left(b^2\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a \operatorname{Sec}[d+e x]^2\right.\right.\right. \\
& \quad \left.\left.\left.\operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \\
& \quad \left(2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)- \\
& \quad \left(4 a c\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a\right.\right.\right. \\
& \quad \left.\left.\left.\operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \\
& \quad \left(2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)+ \\
& \quad \left(4 b c\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a\right.\right.\right. \\
& \quad \left.\left.\left.\operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \\
& \quad \left(2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)-
\end{aligned}$$



$$\left( 8 c^2 \left( 2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x] + \left( \sqrt{c} \left( 2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x] + 4 a \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3 \right) \right) / \left( \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \right) \right) \right) / \left( 2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \right) + \left( 8 c^{3/2} \sqrt{a-b+c} \left( 2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x] + 2 \left( -2 a \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x] + \left( \sqrt{a-b+c} \left( 2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x] + 4 a \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3 \right) \right) / \left( 2 \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \right) \right) \right) \right) / \left( b \left( -1+\operatorname{Tan}[d+e x]^2 \right) + 2 \left( c-a \operatorname{Tan}[d+e x]^2+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \right) \right) \right) \right)$$

**Problem 24: Result more than twice size of optimal antiderivative.**

$$\int \operatorname{Cot}[d+e x] \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} dx$$

Optimal (type 3, 179 leaves, 8 steps):

$$\frac{\sqrt{a-b+c} \operatorname{ArcTanh}\left[\frac{2 a-b+(b-2 c) \operatorname{Cot}[d+e x]^2}{2 \sqrt{a-b+c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{2 e} - \frac{(b-2 c) \operatorname{ArcTanh}\left[\frac{b-2 c \operatorname{Cot}[d+e x]^2}{2 \sqrt{c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{4 \sqrt{c} e} - \frac{\sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}{2 e}$$

Result (type 3, 3486 leaves):

$$-\frac{1}{2 e} \left( \sqrt{\left( (3 a+b+3 c-4 a \operatorname{Cos}[2(d+e x)]+4 c \operatorname{Cos}[2(d+e x)]+a \operatorname{Cos}[4(d+e x)]-b \operatorname{Cos}[4(d+e x)]+c \operatorname{Cos}[4(d+e x)]) / (3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]) \right)} \right) + \left( \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \left( 2 \sqrt{c} \sqrt{a-b+c} \operatorname{Log}[\operatorname{Sec}[d+e x]^2] + (b-2 c) \operatorname{Log}[\operatorname{Tan}[d+e x]^2] - b \operatorname{Log}[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}] + 2 c \operatorname{Log}[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}] - 2 \sqrt{c} \sqrt{a-b+c} \operatorname{Log}[-b+(-2 a+b) \operatorname{Tan}[d+e x]^2+2 \left( c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4} \right)] \right) \right) \left( \left( 2 a \sqrt{\left( \frac{3 a}{3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]} + \frac{b}{3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]} + \frac{3 c}{3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]} - \frac{4 a \operatorname{Cos}[2(d+e x)]}{3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]} + \frac{4 c \operatorname{Cos}[2(d+e x)]}{3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]} + \frac{a \operatorname{Cos}[4(d+e x)]}{3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)]} - \right. \right.$$

$$\begin{aligned}
 & \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \sin [2 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+ \\
 & a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)])- \\
 & \left( 2 c \sqrt{\left(\frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right)+\right. \\
 & \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+ \\
 & \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}- \\
 & \left.\frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \sin [2 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+ \\
 & a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)])- \\
 & \left( a \sqrt{\left(\frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right)+\right. \\
 & \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+ \\
 & \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}- \\
 & \left.\frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \sin [4 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+ \\
 & a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)])+ \\
 & \left( b \sqrt{\left(\frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right)+\right. \\
 & \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}-\frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+ \\
 & \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}- \\
 & \left.\frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}+\frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]}\right) \\
 & \sin [4 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+
 \end{aligned}$$

$$\begin{aligned}
 & a \cos [4 (d+e x)] - b \cos [4 (d+e x)] + c \cos [4 (d+e x)] - \\
 & \left( c \sqrt{\left( \frac{3 a}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{b}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \right. \right. \\
 & \quad \frac{3 c}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} - \frac{4 a \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \\
 & \quad \frac{4 c \cos [2 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{a \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} - \\
 & \quad \left. \frac{b \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} + \frac{c \cos [4 (d+e x)]}{3-4 \cos [2 (d+e x)]+\cos [4 (d+e x)]} \right) \\
 & \sin [4 (d+e x)] \Big/ (3 a+b+3 c-4 a \cos [2 (d+e x)]+4 c \cos [2 (d+e x)]+ \\
 & \quad a \cos [4 (d+e x)]-b \cos [4 (d+e x)]+c \cos [4 (d+e x)]) \Big) \\
 & \tan [d+e x]^2 \Big/ \left( 4 \sqrt{c} e^{\sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}} \right. \\
 & \left. \left( -\frac{1}{8 \sqrt{c} (c+b \tan [d+e x]^2+a \tan [d+e x]^4)^{3/2}} \sqrt{a+b \cot [d+e x]^2+c \cot [d+e x]^4} \right. \right. \\
 & \quad \left( 2 \sqrt{c} \sqrt{a-b+c} \log [\sec [d+e x]^2] + (b-2 c) \log [\tan [d+e x]^2] - \right. \\
 & \quad b \log [2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}] + \\
 & \quad 2 c \log [2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}] - \\
 & \quad 2 \sqrt{c} \sqrt{a-b+c} \log [-b+(-2 a+b) \tan [d+e x]^2+ \\
 & \quad \left. \left. 2\left(c+\sqrt{a-b+c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)\right] \right) \\
 & \quad \tan [d+e x]^2 (2 b \sec [d+e x]^2 \tan [d+e x]+4 a \sec [d+e x]^2 \tan [d+e x]^3)+ \\
 & \quad \frac{1}{2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}} \sqrt{a+b \cot [d+e x]^2+c \cot [d+e x]^4} \\
 & \quad \left( 2 \sqrt{c} \sqrt{a-b+c} \log [\sec [d+e x]^2] + (b-2 c) \log [\tan [d+e x]^2] - \right. \\
 & \quad b \log [2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}] + \\
 & \quad 2 c \log [2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}] - \\
 & \quad 2 \sqrt{c} \sqrt{a-b+c} \log [-b+(-2 a+b) \tan [d+e x]^2+ \\
 & \quad \left. \left. 2\left(c+\sqrt{a-b+c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}\right)\right] \right) \sec [d+e x]^2 \tan [d+e x]+ \\
 & \quad \left( (-2 b \cot [d+e x] \csc [d+e x]^2-4 c \cot [d+e x]^3 \csc [d+e x]^2) \right. \\
 & \quad \left( 2 \sqrt{c} \sqrt{a-b+c} \log [\sec [d+e x]^2] + (b-2 c) \log [\tan [d+e x]^2] - \right. \\
 & \quad \left. b \log [2 c+b \tan [d+e x]^2+2 \sqrt{c} \sqrt{c+b \tan [d+e x]^2+a \tan [d+e x]^4}] + \right.
 \end{aligned}$$

$$\begin{aligned}
 & \frac{2 c \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]-2 \sqrt{c} \sqrt{a-b+c} \operatorname{Log}\left[-b+(-2 a+b) \operatorname{Tan}[d+e x]^2+\right.}{2\left(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\left.\right] \operatorname{Tan}[d+e x]^2}{\left(8 \sqrt{c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)+} \\
 & \frac{1}{4 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}} \\
 & \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \operatorname{Tan}[d+e x]^2 \\
 & \left(2(b-2 c) \operatorname{Csc}[d+e x] \operatorname{Sec}[d+e x]+4 \sqrt{c} \sqrt{a-b+c} \operatorname{Tan}[d+e x]-\right. \\
 & \left.(b\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a \operatorname{Sec}[d+e x]^2\right.\right.\right.\right. \\
 & \left.\left.\left.\operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \\
 & \left(2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)+ \\
 & \left(2 c\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a\right.\right.\right.\right. \\
 & \left.\left.\left.\operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \\
 & \left(2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)- \\
 & \left(2 \sqrt{c} \sqrt{a-b+c}\left(2(-2 a+b) \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\right.\right. \\
 & \left.\left.\left(\sqrt{a-b+c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \right. \\
 & \left.\left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \left(-b+(-2 a+b) \operatorname{Tan}[d+e x]^2+\right. \\
 & \left.2\left(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right) / \left.\right)
 \end{aligned}$$

**Problem 25: Result more than twice size of optimal antiderivative.**

$$\int \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \operatorname{Tan}[d+e x] \operatorname{d} x$$

Optimal (type 3, 203 leaves, 10 steps):

$$\frac{\sqrt{a} \operatorname{ArcTanh}\left[\frac{2a+b \cot [d+ex]^2}{2\sqrt{a} \sqrt{a+b \cot [d+ex]^2+c \cot [d+ex]^4}}\right]}{2e} -$$

$$\frac{\sqrt{a-b+c} \operatorname{ArcTanh}\left[\frac{2a-b+(b-2c) \cot [d+ex]^2}{2\sqrt{a-b+c} \sqrt{a+b \cot [d+ex]^2+c \cot [d+ex]^4}}\right]}{2e} -$$

$$\frac{\sqrt{c} \operatorname{ArcTanh}\left[\frac{b+2c \cot [d+ex]^2}{2\sqrt{c} \sqrt{a+b \cot [d+ex]^2+c \cot [d+ex]^4}}\right]}{2e}$$

Result (type 3, 1999 leaves):

$$\left( \sqrt{\left( \frac{3a}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} + \frac{b}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} + \frac{3c}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} - \frac{4a \cos [2(d+ex)]}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} + \frac{4c \cos [2(d+ex)]}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} + \frac{a \cos [4(d+ex)]}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} - \frac{b \cos [4(d+ex)]}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} + \frac{c \cos [4(d+ex)]}{3-4 \cos [2(d+ex)] + \cos [4(d+ex)]} \right)} \right)$$

$$\sqrt{a+b \cot [d+ex]^2+c \cot [d+ex]^4} \left( -\sqrt{a-b+c} \operatorname{Log} [\operatorname{Sec} [d+ex]^2] + \sqrt{c} \operatorname{Log} [\operatorname{Tan} [d+ex]^2] + \right.$$

$$\sqrt{a} \operatorname{Log} [b+2a \operatorname{Tan} [d+ex]^2+2\sqrt{a} \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4}] -$$

$$\left. \sqrt{c} \operatorname{Log} [2c+b \operatorname{Tan} [d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4}] + \sqrt{a-b+c} \operatorname{Log} [-b+(-2a+b) \operatorname{Tan} [d+ex]^2+2(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4})] \right)$$

$$\operatorname{Tan} [d+ex]^3 \Big/ \left( 2e \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4} \right)$$

$$\left( -\frac{1}{4(c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4)^{3/2}} \sqrt{a+b \cot [d+ex]^2+c \cot [d+ex]^4} \right.$$

$$\left( -\sqrt{a-b+c} \operatorname{Log} [\operatorname{Sec} [d+ex]^2] + \sqrt{c} \operatorname{Log} [\operatorname{Tan} [d+ex]^2] + \sqrt{a} \operatorname{Log} [b+2a \operatorname{Tan} [d+ex]^2+2\sqrt{a} \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4}] - \sqrt{c} \operatorname{Log} [2c+b \operatorname{Tan} [d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4}] + \sqrt{a-b+c} \operatorname{Log} [-b+(-2a+b) \operatorname{Tan} [d+ex]^2+2(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4})] \right)$$

$$\operatorname{Tan} [d+ex]^2 (2b \operatorname{Sec} [d+ex]^2 \operatorname{Tan} [d+ex] + 4a \operatorname{Sec} [d+ex]^2 \operatorname{Tan} [d+ex]^3) +$$

$$\frac{1}{\sqrt{c+b \operatorname{Tan} [d+ex]^2+a \operatorname{Tan} [d+ex]^4}} \sqrt{a+b \cot [d+ex]^2+c \cot [d+ex]^4}$$

$$\left( -\sqrt{a-b+c} \operatorname{Log} [\operatorname{Sec} [d+ex]^2] + \sqrt{c} \operatorname{Log} [\operatorname{Tan} [d+ex]^2] + \right.$$

$$\begin{aligned}
& \sqrt{a} \operatorname{Log}\left[b+2 a \operatorname{Tan}[d+e x]^2+2 \sqrt{a} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]-\sqrt{c} \\
& \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]+\sqrt{a-b+c} \operatorname{Log}\left[ \right. \\
& \quad \left.-b+(-2 a+b) \operatorname{Tan}[d+e x]^2+2\left(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right] \\
& \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left((-2 b \operatorname{Cot}[d+e x] \operatorname{Csc}[d+e x]^2-4 c \operatorname{Cot}[d+e x]^3 \operatorname{Csc}[d+e x]^2\right) \\
& \quad \left(-\sqrt{a-b+c} \operatorname{Log}\left[\operatorname{Sec}[d+e x]^2\right]+\sqrt{c} \operatorname{Log}\left[\operatorname{Tan}[d+e x]^2\right]+ \right. \\
& \quad \sqrt{a} \operatorname{Log}\left[b+2 a \operatorname{Tan}[d+e x]^2+2 \sqrt{a} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]- \\
& \quad \sqrt{c} \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]+ \\
& \quad \left.\sqrt{a-b+c} \operatorname{Log}\left[-b+(-2 a+b) \operatorname{Tan}[d+e x]^2+ \right. \right. \\
& \quad \quad \left. \left. 2\left(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right]\right) \operatorname{Tan}[d+e x]^2\left. \right) / \\
& \left(4 \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)+ \\
& \frac{1}{2 \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \\
& \operatorname{Tan}[d+e x]^2\left(2 \sqrt{c} \operatorname{Csc}[d+e x] \operatorname{Sec}[d+e x]-2 \sqrt{a-b+c} \operatorname{Tan}[d+e x]+ \right. \\
& \quad \left(\sqrt{a}\left(4 a \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{a}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a \right. \right. \right. \\
& \quad \quad \left. \left. \left. \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right)\left. \right) / \\
& \left(b+2 a \operatorname{Tan}[d+e x]^2+2 \sqrt{a} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)- \\
& \left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+\left(\sqrt{c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a \right. \right. \right. \right. \\
& \quad \left. \left. \left. \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right)\left. \right) / \\
& \left(2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)+ \\
& \left(\sqrt{a-b+c}\left(2(-2 a+b) \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+ \right. \right. \\
& \quad \left.\left(\sqrt{a-b+c}\left(2 b \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]+4 a \operatorname{Sec}[d+e x]^2 \operatorname{Tan}[d+e x]^3\right)\right)\right) / \\
& \quad \left.\left(\sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right)\left. \right) / \left(-b+(-2 a+b) \operatorname{Tan}[d+e x]^2+ \right. \\
& \quad \left. \left. 2\left(c+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right)\right)\right)\left. \right)
\end{aligned}$$

**Problem 26: Humongous result has more than 200000 leaves.**

$$\int \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \operatorname{Tan}[d+e x]^3 dx$$

Optimal (type 3, 435 leaves, 22 steps):

$$\begin{aligned}
 & - \frac{\sqrt{a} \operatorname{ArcTanh}\left[\frac{2 a+b \operatorname{Cot}[d+e x]^2}{2 \sqrt{a} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{2 e} + \frac{b \operatorname{ArcTanh}\left[\frac{2 a+b \operatorname{Cot}[d+e x]^2}{2 \sqrt{a} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{4 \sqrt{a} e} + \\
 & \frac{\sqrt{a-b+c} \operatorname{ArcTanh}\left[\frac{2 a-b+(b-2 c) \operatorname{Cot}[d+e x]^2}{2 \sqrt{a-b+c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{2 e} + \\
 & \frac{b \operatorname{ArcTanh}\left[\frac{b+2 c \operatorname{Cot}[d+e x]^2}{2 \sqrt{c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{4 \sqrt{c} e} - \frac{(b-2 c) \operatorname{ArcTanh}\left[\frac{b+2 c \operatorname{Cot}[d+e x]^2}{2 \sqrt{c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{4 \sqrt{c} e} - \\
 & \frac{\sqrt{c} \operatorname{ArcTanh}\left[\frac{b+2 c \operatorname{Cot}[d+e x]^2}{2 \sqrt{c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{2 e} + \frac{\sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4} \operatorname{Tan}[d+e x]^2}{2 e}
 \end{aligned}$$

Result (type ?, 215 131 leaves): Display of huge result suppressed!

**Problem 27: Result more than twice size of optimal antiderivative.**

$$\int \frac{\operatorname{Cot}[d+e x]^7}{(a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4)^{3/2}} dx$$

Optimal (type 3, 236 leaves, 8 steps):

$$\begin{aligned}
 & - \frac{\operatorname{ArcTanh}\left[\frac{2 a-b+(b-2 c) \operatorname{Cot}[d+e x]^2}{2 \sqrt{a-b+c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{2(a-b+c)^{3/2} e} - \frac{\operatorname{ArcTanh}\left[\frac{b+2 c \operatorname{Cot}[d+e x]^2}{2 \sqrt{c} \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}\right]}{2 c^{3/2} e} - \\
 & \frac{a(b^2-a(b+2 c))+(b^3+2 a^2 c-a b(b+3 c)) \operatorname{Cot}[d+e x]^2}{c(a-b+c)(b^2-4 a c) e \sqrt{a+b \operatorname{Cot}[d+e x]^2+c \operatorname{Cot}[d+e x]^4}}
 \end{aligned}$$

Result (type 3, 3921 leaves):

$$\begin{aligned}
 & \frac{1}{e} \sqrt{\left(\left(3 a+b+3 c-4 a \operatorname{Cos}[2(d+e x)]+4 c \operatorname{Cos}[2(d+e x)]+a \operatorname{Cos}[4(d+e x)]-b \operatorname{Cos}[4(d+e x)]+c \operatorname{Cos}[4(d+e x)]\right) / \right. \\
 & \left.(3-4 \operatorname{Cos}[2(d+e x)]+\operatorname{Cos}[4(d+e x)])\right)\left(-\frac{a^2 b-2 a b^2+b^3+4 a^2 c-3 a b c}{c(a-b+c)^2(-b^2+4 a c)}-\right. \\
 & \left.4\left(-2 a^3+a^2 b+a b^2-b^3-2 a^2 c+3 a b c+2 a^3 \operatorname{Cos}[2(d+e x)]-3 a^2 b \operatorname{Cos}[2(d+e x)]+3 a b^2 \operatorname{Cos}[2(d+e x)]-b^3 \operatorname{Cos}[2(d+e x)]-6 a^2 c \operatorname{Cos}[2(d+e x)]+3 a b c \operatorname{Cos}[2(d+e x)]\right) / \right. \\
 & \left.\left((a-b+c)^2(-b^2+4 a c)\left(3 a+b+3 c-4 a \operatorname{Cos}[2(d+e x)]+4 c \operatorname{Cos}[2(d+e x)]+a \operatorname{Cos}[4(d+e x)]-b \operatorname{Cos}[4(d+e x)]+c \operatorname{Cos}[4(d+e x)]\right)\right)\right)+ \\
 & \left(\left(\left(a-b+c\right) \operatorname{Log}[\operatorname{Tan}[d+e x]^2]-\frac{c^{3/2} \operatorname{Log}\left[1+\operatorname{Tan}[d+e x]^2\right]}{\sqrt{a-b+c}}-\right. \right. \\
 & \left. \left.a \operatorname{Log}\left[2 c+b \operatorname{Tan}[d+e x]^2+2 \sqrt{c} \sqrt{c+b \operatorname{Tan}[d+e x]^2+a \operatorname{Tan}[d+e x]^4}\right]+ \right. \right.
 \end{aligned}$$

$$\begin{aligned}
& b \operatorname{Log}\left[2c + b \tan[d + ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4}\right] - \\
& c \operatorname{Log}\left[2c + b \tan[d + ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4}\right] + \\
& \frac{1}{\sqrt{a-b+c}} c^{3/2} \operatorname{Log}\left[b(-1 + \tan[d + ex]^2) + \right. \\
& \left. 2\left(c - a \tan[d + ex]^2 + \sqrt{a-b+c} \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4}\right)\right] \\
& \left( \left( 2 \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \right. \\
& \left. \frac{3c}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \\
& \left. \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \right. \\
& \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} \right) \\
& \left. \sin[2(d+ex)] \right) / \left( (a-b+c)(3a+b+3c-4a\cos[2(d+ex)] + \right. \\
& \left. 4c\cos[2(d+ex)] + a\cos[4(d+ex)] - b\cos[4(d+ex)] + c\cos[4(d+ex)]) \right) + \\
& \left( 4a \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \\
& \left. \frac{3c}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \\
& \left. \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \right. \\
& \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} \right) \\
& \left. \sin[2(d+ex)] \right) / \left( c(a-b+c)(3a+b+3c-4a\cos[2(d+ex)] + \right. \\
& \left. 4c\cos[2(d+ex)] + a\cos[4(d+ex)] - b\cos[4(d+ex)] + c\cos[4(d+ex)]) \right) - \\
& \left( 4b \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \\
& \left. \frac{3c}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \\
& \left. \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \right. \\
& \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} \right) \\
& \left. \sin[2(d+ex)] \right) / \left( c(a-b+c)(3a+b+3c-4a\cos[2(d+ex)] + \right. \\
& \left. 4c\cos[2(d+ex)] + a\cos[4(d+ex)] - b\cos[4(d+ex)] + c\cos[4(d+ex)]) \right) -
\end{aligned}$$



$$\begin{aligned}
 & \left. \left( \frac{\sin[2(d+ex)]}{(c(a-b+c)(3a+b+3c-4a\cos[2(d+ex)] + 4c\cos[2(d+ex)] + a\cos[4(d+ex)] - b\cos[4(d+ex)] + c\cos[4(d+ex)]))} + \right. \right. \\
 & \left. \left( \sqrt{\left( \frac{3a}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{b}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \right. \\
 & \left. \left. \frac{3c}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \frac{4a\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \right. \right. \\
 & \left. \left. \frac{4c\cos[2(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{a\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} - \right. \right. \\
 & \left. \left. \frac{b\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} + \frac{c\cos[4(d+ex)]}{3-4\cos[2(d+ex)] + \cos[4(d+ex)]} \right) \right) \\
 & \left. \frac{\sin[4(d+ex)]}{((a-b+c)(3a+b+3c-4a\cos[2(d+ex)] + 4c\cos[2(d+ex)] + a\cos[4(d+ex)] - b\cos[4(d+ex)] + c\cos[4(d+ex)]))} \right) \\
 & \left. \frac{\tan[d+ex]^2 \sqrt{a + \cot[d+ex]^4 (c + b \tan[d+ex]^2)}}{2} \right) \\
 & \frac{c^{3/2} (a-b+c) e \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4}}{4 c^{3/2} (a-b+c) (c + b \tan[d+ex]^2 + a \tan[d+ex]^4)^{3/2}} \\
 & \left( (a-b+c) \log[\tan[d+ex]^2] - \frac{c^{3/2} \log[1 + \tan[d+ex]^2]}{\sqrt{a-b+c}} - \right. \\
 & a \log[2c + b \tan[d+ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4}] + \\
 & b \log[2c + b \tan[d+ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4}] - \\
 & c \log[2c + b \tan[d+ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4}] + \\
 & \left. \frac{1}{\sqrt{a-b+c}} c^{3/2} \log[b(-1 + \tan[d+ex]^2)] + \right. \\
 & \left. 2 \left( c - a \tan[d+ex]^2 + \sqrt{a-b+c} \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4} \right) \right) \\
 & \frac{\tan[d+ex]^2 (2b \sec[d+ex]^2 \tan[d+ex] + 4a \sec[d+ex]^2 \tan[d+ex]^3)}{\sqrt{a + \cot[d+ex]^4 (c + b \tan[d+ex]^2)}} + \\
 & \frac{1}{c^{3/2} (a-b+c) \sqrt{c + b \tan[d+ex]^2 + a \tan[d+ex]^4}}
 \end{aligned}$$

$$\begin{aligned}
 & \left( (a-b+c) \operatorname{Log}[\operatorname{Tan}[d+ex]^2] - \frac{c^{3/2} \operatorname{Log}[1+\operatorname{Tan}[d+ex]^2]}{\sqrt{a-b+c}} - \right. \\
 & \quad a \operatorname{Log}[2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4}] + \\
 & \quad b \operatorname{Log}[2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4}] - \\
 & \quad c \operatorname{Log}[2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4}] + \\
 & \quad \frac{1}{\sqrt{a-b+c}} c^{3/2} \operatorname{Log}[b(-1+\operatorname{Tan}[d+ex]^2) + \\
 & \quad \left. 2(c-a \operatorname{Tan}[d+ex]^2+\sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4})] \right) \\
 & \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] \sqrt{a+\operatorname{Cot}[d+ex]^4(c+b \operatorname{Tan}[d+ex]^2)} + \\
 & \left( \left( (a-b+c) \operatorname{Log}[\operatorname{Tan}[d+ex]^2] - \frac{c^{3/2} \operatorname{Log}[1+\operatorname{Tan}[d+ex]^2]}{\sqrt{a-b+c}} - \right. \right. \\
 & \quad a \operatorname{Log}[2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4}] + \\
 & \quad b \operatorname{Log}[2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4}] - \\
 & \quad c \operatorname{Log}[2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4}] + \\
 & \quad \frac{1}{\sqrt{a-b+c}} c^{3/2} \operatorname{Log}[b(-1+\operatorname{Tan}[d+ex]^2) + 2(c-a \operatorname{Tan}[d+ex]^2+ \\
 & \quad \left. \left. \sqrt{a-b+c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4})] \right) \right) \operatorname{Tan}[d+ex]^2 \\
 & \left. (2b \operatorname{Cot}[d+ex] \operatorname{Csc}[d+ex]^2 - 4 \operatorname{Cot}[d+ex]^3 \operatorname{Csc}[d+ex]^2 (c+b \operatorname{Tan}[d+ex]^2)) \right) / \\
 & \left( 4c^{3/2} (a-b+c) \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4} \right. \\
 & \quad \left. \sqrt{a+\operatorname{Cot}[d+ex]^4(c+b \operatorname{Tan}[d+ex]^2)} \right) + \\
 & \frac{1}{2c^{3/2} (a-b+c) \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4} \operatorname{Tan}[d+ex]^2 \sqrt{a+\operatorname{Cot}[d+ex]^4(c+b \operatorname{Tan}[d+ex]^2)}} \\
 & \left( 2(a-b+c) \operatorname{Csc}[d+ex] \operatorname{Sec}[d+ex] - \frac{2c^{3/2} \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex]}{\sqrt{a-b+c} (1+\operatorname{Tan}[d+ex]^2)} - \right. \\
 & \quad \left( a \left( 2b \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + \left( \sqrt{c} (2b \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + 4a \operatorname{Sec}[d+ex]^2 \right. \right. \right. \\
 & \quad \left. \left. \left. \operatorname{Tan}[d+ex]^3) \right) \right) / \left( \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4} \right) \right) / \\
 & \quad \left( 2c+b \operatorname{Tan}[d+ex]^2+2\sqrt{c} \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4} \right) + \\
 & \quad \left( b \left( 2b \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + \left( \sqrt{c} (2b \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex] + 4a \right. \right. \right. \\
 & \quad \left. \left. \left. \operatorname{Sec}[d+ex]^2 \operatorname{Tan}[d+ex]^3) \right) \right) / \left( \sqrt{c+b \operatorname{Tan}[d+ex]^2+a \operatorname{Tan}[d+ex]^4} \right) \right) /
 \end{aligned}$$

$$\begin{aligned}
 & \left( 2c + b \tan[d + ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4} \right) - \\
 & \left( c \left( 2b \sec[d + ex]^2 \tan[d + ex] + \left( \sqrt{c} \left( 2b \sec[d + ex]^2 \tan[d + ex] + 4a \right. \right. \right. \right. \\
 & \quad \left. \left. \left. \sec[d + ex]^2 \tan[d + ex]^3 \right) \right) / \left( \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4} \right) \right) \right) / \\
 & \left( 2c + b \tan[d + ex]^2 + 2\sqrt{c} \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4} \right) + \\
 & \left( c^{3/2} \left( 2b \sec[d + ex]^2 \tan[d + ex] + 2 \left( -2a \sec[d + ex]^2 \tan[d + ex] + \right. \right. \right. \\
 & \quad \left. \left. \left( \sqrt{a - b + c} \left( 2b \sec[d + ex]^2 \tan[d + ex] + 4a \sec[d + ex]^2 \tan[d + ex]^3 \right) \right) / \right. \right. \\
 & \quad \left. \left. \left( 2 \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4} \right) \right) \right) \right) / \\
 & \left( \sqrt{a - b + c} \left( b \left( -1 + \tan[d + ex]^2 \right) + 2 \left( c - a \tan[d + ex]^2 + \sqrt{a - b + c} \right. \right. \right. \\
 & \quad \left. \left. \left. \sqrt{c + b \tan[d + ex]^2 + a \tan[d + ex]^4} \right) \right) \right) \right) \right) \right)
 \end{aligned}$$

**Problem 28: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\cot[d + ex]^5}{(a + b \cot[d + ex]^2 + c \cot[d + ex]^4)^{3/2}} dx$$

Optimal (type 3, 160 leaves, 6 steps):

$$\frac{\text{ArcTanh}\left[\frac{2a - b + (b - 2c) \cot[d + ex]^2}{2\sqrt{a - b + c} \sqrt{a + b \cot[d + ex]^2 + c \cot[d + ex]^4}}\right]}{2(a - b + c)^{3/2} e} - \frac{a(2a - b) + ((a - b)b + 2ac) \cot[d + ex]^2}{(a - b + c)(b^2 - 4ac) e \sqrt{a + b \cot[d + ex]^2 + c \cot[d + ex]^4}}$$

Result (type 4, 78272 leaves): Display of huge result suppressed!

**Problem 29: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\cot[d + ex]^3}{(a + b \cot[d + ex]^2 + c \cot[d + ex]^4)^{3/2}} dx$$

Optimal (type 3, 153 leaves, 6 steps):

$$\begin{aligned}
& \frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\text{Cot}[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}\right]}{2(a-b+c)^{3/2}e} + \\
& \frac{a(b-2c) + (2a-b)c\text{Cot}[d+ex]^2}{(a-b+c)(b^2-4ac)e\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}
\end{aligned}$$

Result (type 4, 78265 leaves): Display of huge result suppressed!

**Problem 30: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Cot}[d+ex]}{(a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4)^{3/2}} dx$$

Optimal (type 3, 156 leaves, 6 steps):

$$\begin{aligned}
& \frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\text{Cot}[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}\right]}{2(a-b+c)^{3/2}e} - \\
& \frac{b^2-2ac-bc+(b-2c)c\text{Cot}[d+ex]^2}{(a-b+c)(b^2-4ac)e\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}
\end{aligned}$$

Result (type 4, 78291 leaves): Display of huge result suppressed!

**Problem 31: Result unnecessarily involves higher level functions and more than twice size of optimal antiderivative.**

$$\int \frac{\text{Tan}[d+ex]}{(a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4)^{3/2}} dx$$

Optimal (type 3, 280 leaves, 12 steps):

$$\begin{aligned}
& \frac{\text{ArcTanh}\left[\frac{2a+b\text{Cot}[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}\right]}{2a^{3/2}e} - \frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\text{Cot}[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}\right]}{2(a-b+c)^{3/2}e} + \\
& \frac{b^2-2ac+bc\text{Cot}[d+ex]^2}{a(b^2-4ac)e\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}} + \\
& \frac{b^2-2ac-bc+(b-2c)c\text{Cot}[d+ex]^2}{(a-b+c)(b^2-4ac)e\sqrt{a+b\text{Cot}[d+ex]^2+c\text{Cot}[d+ex]^4}}
\end{aligned}$$

Result (type 4, 181078 leaves): Display of huge result suppressed!

Problem 32: Humongous result has more than 200000 leaves.

$$\int \frac{\text{Tan}[d+ex]^3}{(a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4)^{3/2}} dx$$

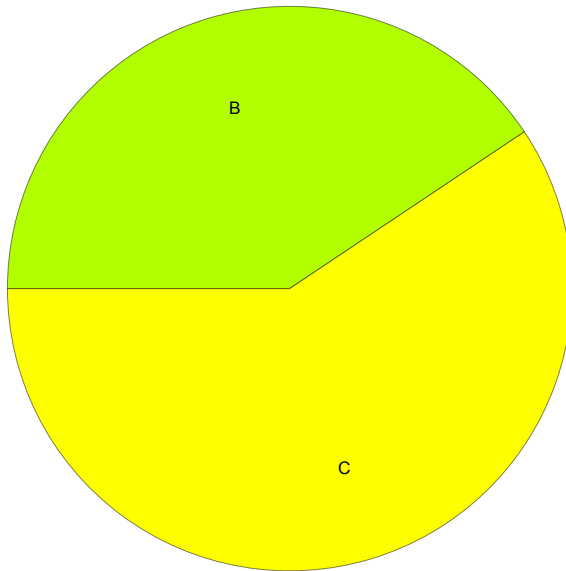
Optimal (type 3, 478 leaves, 16 steps):

$$\begin{aligned} & -\frac{\text{ArcTanh}\left[\frac{2a+b \text{Cot}[d+ex]^2}{2\sqrt{a}\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}}\right]}{2a^{3/2}e} - \frac{3b \text{ArcTanh}\left[\frac{2a+b \text{Cot}[d+ex]^2}{2\sqrt{a}\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}}\right]}{4a^{5/2}e} + \\ & \frac{\text{ArcTanh}\left[\frac{2a-b+(b-2c)\text{Cot}[d+ex]^2}{2\sqrt{a-b+c}\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}}\right]}{2(a-b+c)^{3/2}e} + \frac{b^2-2ac+b \text{Cot}[d+ex]^2}{a(b^2-4ac)e\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}} - \\ & \frac{b^2-2ac-bc+(b-2c)c \text{Cot}[d+ex]^2}{(a-b+c)(b^2-4ac)e\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}} - \\ & \frac{(b^2-2ac+b \text{Cot}[d+ex]^2)\text{Tan}[d+ex]^2}{a(b^2-4ac)e\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}} + \\ & \frac{(3b^2-8ac)\sqrt{a+b \text{Cot}[d+ex]^2+c \text{Cot}[d+ex]^4}\text{Tan}[d+ex]^2}{2a^2(b^2-4ac)e} \end{aligned}$$

Result (type ?, 293889 leaves): Display of huge result suppressed!

## Summary of Integration Test Results

32 integration problems



- A - 0 optimal antiderivatives
- B - 13 more than twice size of optimal antiderivatives
- C - 19 unnecessarily complex antiderivatives
- D - 0 unable to integrate problems
- E - 0 integration timeouts