

Mathematica 11.3 Integration Test Results

Test results for the 142 problems in "4.7.6 $f^a(a+b x+c x^2) \operatorname{trig}(d+e x+f x^2)^n m^n$ "

Problem 1: Unable to integrate problem.

$$\int F^{c(a+b x)} \sin[d+e x]^n dx$$

Optimal (type 5, 107 leaves, 2 steps) :

$$-\left(\left(\left(1-e^{2 i(d+e x)}\right)^{-n} F^{c(a+b x)} \text{Hypergeometric2F1}\left[-n,-\frac{e n+i b c \log [F]}{2 e},\right.\right.\right.$$

$$\left.\left.\left.\frac{1}{2}\left(2-n-\frac{i b c \log [F]}{e}\right),e^{2 i(d+e x)}\right] \sin[d+e x]^n\right)/\left(i e n-b c \log [F]\right)\right)$$

Result (type 8, 20 leaves) :

$$\int F^{c(a+b x)} \sin[d+e x]^n dx$$

Problem 7: Result more than twice size of optimal antiderivative.

$$\int F^{c(a+b x)} \csc[d+e x]^3 dx$$

Optimal (type 5, 137 leaves, 2 steps) :

$$-\frac{F^{c(a+b x)} \cot [d+e x] \csc [d+e x]}{2 e}-\frac{b c F^{c(a+b x)} \csc [d+e x] \log [F]}{2 e^2}-\frac{1}{e^2} e^{i(d+e x)} F^{c(a+b x)}$$

$$\text{Hypergeometric2F1}\left[1,\frac{e-i b c \log [F]}{2 e},\frac{1}{2}\left(3-\frac{i b c \log [F]}{e}\right),e^{2 i(d+e x)}\right] (e+i b c \log [F])$$

Result (type 5, 450 leaves) :

$$\begin{aligned}
& -\frac{F^{a c+b c x} \csc \left[\frac{d}{2}+\frac{e x}{2}\right]^2}{8 e}-\frac{b c F^{a c+b c x} \csc [d] \log [F]}{2 e^2}+ \\
& \frac{F^{c(a+b x)} \csc [d]\left(e^2+b^2 c^2 \log [F]^2\right)}{2 b c e^2 \log [F]}+\frac{F^{a c+b c x} \sec \left[\frac{d}{2}+\frac{e x}{2}\right]^2}{8 e}- \\
& \left(\frac{i F^{c(a+b x)}\left(e^2+b^2 c^2 \log [F]^2\right)\left(1+\operatorname{Hypergeometric2F1}\left[1,-\frac{i b c \log [F]}{e}, 1-\frac{i b c \log [F]}{e},\right.\right.}{\left.\left.\cos [d+e x]+i \sin [d+e x]\right]\left(-1+\cos [d]+i \sin [d]\right)\right)\right) / \\
& \left(2 b c e^2 \log [F]\left(-1+\cos [d]+i \sin [d]\right)\right)-\left(i F^{c(a+b x)}\left(e^2+b^2 c^2 \log [F]^2\right)\right. \\
& \left.\left(1-\operatorname{Hypergeometric2F1}\left[1,-\frac{i b c \log [F]}{e}, 1-\frac{i b c \log [F]}{e},-\cos [d+e x]-i \sin [d+e x]\right.\right.\right. \\
& \left.\left.\left.\left(1+\cos [d]+i \sin [d]\right)\right)\right) / \left(2 b c e^2 \log [F]\left(1+\cos [d]+i \sin [d]\right)\right)+ \\
& \frac{b c F^{a c+b c x} \csc \left[\frac{d}{2}\right] \csc \left[\frac{d}{2}+\frac{e x}{2}\right] \log [F] \sin \left[\frac{e x}{2}\right]}{4 e^2}-\frac{b c F^{a c+b c x} \log [F] \sec \left[\frac{d}{2}\right] \sec \left[\frac{d}{2}+\frac{e x}{2}\right] \sin \left[\frac{e x}{2}\right]}{4 e^2}
\end{aligned}$$

Problem 10: Unable to integrate problem.

$$\int F^{c(a+b x)} \cos [d+e x]^n dx$$

Optimal (type 5, 107 leaves, 2 steps):

$$\begin{aligned}
& -\left(\left(\left(1+e^{2 i(d+e x)}\right)^{-n} F^{c(a+b x)} \cos [d+e x]^n \operatorname{Hypergeometric2F1}\left[-n,\right.\right.\right. \\
& \left.\left.\left.-\frac{e n+i b c \log [F]}{2 e}, \frac{1}{2}\left(2-n-\frac{i b c \log [F]}{e}\right),-e^{2 i(d+e x)}\right]\right) / \left(i e n-b c \log [F]\right)
\end{aligned}$$

Result (type 8, 20 leaves):

$$\int F^{c(a+b x)} \cos [d+e x]^n dx$$

Problem 14: Unable to integrate problem.

$$\int F^{c(a+b x)} \sec [d+e x] dx$$

Optimal (type 5, 84 leaves, 1 step):

$$\begin{aligned}
& \frac{1}{i e+b c \log [F]} \\
& 2 e^{i(d+e x)} F^{c(a+b x)} \operatorname{Hypergeometric2F1}\left[1,\frac{e-i b c \log [F]}{2 e}, \frac{1}{2}\left(3-\frac{i b c \log [F]}{e}\right),-e^{2 i(d+e x)}\right]
\end{aligned}$$

Result (type 8, 18 leaves):

$$\int F^{c(a+b x)} \sec [d+e x] dx$$

Problem 16: Unable to integrate problem.

$$\int F^c(a+b x) \sec[d+e x]^3 dx$$

Optimal (type 5, 141 leaves, 2 steps):

$$-\frac{1}{e^2} e^{i(d+e x)} F^c(a+b x) \operatorname{Hypergeometric2F1}\left[1, \frac{e-i b c \operatorname{Log}[F]}{2 e}, \frac{1}{2} \left(3 - \frac{i b c \operatorname{Log}[F]}{e}\right), -e^{2 i(d+e x)}\right] \\ + \frac{(i e - b c \operatorname{Log}[F]) - \frac{b c F^c(a+b x) \operatorname{Log}[F] \sec[d+e x]}{2 e^2} + \frac{F^c(a+b x) \sec[d+e x] \tan[d+e x]}{2 e}}{2 e}$$

Result (type 8, 20 leaves):

$$\int F^c(a+b x) \sec[d+e x]^3 dx$$

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

$$\int e^c(a+b x) \tan[d+e x] dx$$

Optimal (type 5, 78 leaves, 4 steps):

$$-\frac{i e^c(a+b x)}{b c} + \frac{2 i e^c(a+b x) \operatorname{Hypergeometric2F1}\left[1, -\frac{i b c}{2 e}, 1 - \frac{i b c}{2 e}, -e^{2 i(d+e x)}\right]}{b c}$$

Result (type 5, 166 leaves):

$$\left(e^c(a+b x) \left(2 b c e^{2 i(d+e x)} \operatorname{Hypergeometric2F1}\left[1, 1 - \frac{i b c}{2 e}, 2 - \frac{i b c}{2 e}, -e^{2 i(d+e x)}\right] - (b c + 2 i e) \left(1 - e^{2 i d} + 2 e^{2 i d} \operatorname{Hypergeometric2F1}\left[1, -\frac{i b c}{2 e}, 1 - \frac{i b c}{2 e}, -e^{2 i(d+e x)}\right]\right)\right)\right) / (b c (i b c - 2 e) (1 + e^{2 i d}))$$

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

$$\int e^c(a+b x) \cot[d+e x] dx$$

Optimal (type 5, 76 leaves, 4 steps):

$$\frac{i e^c(a+b x)}{b c} - \frac{2 i e^c(a+b x) \operatorname{Hypergeometric2F1}\left[1, -\frac{i b c}{2 e}, 1 - \frac{i b c}{2 e}, e^{2 i(d+e x)}\right]}{b c}$$

Result (type 5, 163 leaves):

$$\left(e^c(a+b x) \left(2 i b c e^{2 i(d+e x)} \operatorname{Hypergeometric2F1}\left[1, 1 - \frac{i b c}{2 e}, 2 - \frac{i b c}{2 e}, e^{2 i(d+e x)}\right] + i (b c + 2 i e) \left(1 + e^{2 i d} - 2 e^{2 i d} \operatorname{Hypergeometric2F1}\left[1, -\frac{i b c}{2 e}, 1 - \frac{i b c}{2 e}, e^{2 i(d+e x)}\right]\right)\right)\right) / (b c (b c + 2 i e) (-1 + e^{2 i d}))$$

Problem 26: Unable to integrate problem.

$$\int F^{c(a+b x)} \operatorname{Sec}[d+e x]^n dx$$

Optimal (type 5, 100 leaves, 2 steps):

$$\frac{1}{\frac{i e n + b c \operatorname{Log}[F]}{}} \left(1 + e^{2 i (d+e x)}\right)^n F^{a c + b c x} \\ \operatorname{Hypergeometric2F1}\left[n, \frac{e n - i b c \operatorname{Log}[F]}{2 e}, \frac{1}{2} \left(2 + n - \frac{i b c \operatorname{Log}[F]}{e}\right), -e^{2 i (d+e x)}\right] \operatorname{Sec}[d+e x]^n$$

Result (type 8, 20 leaves):

$$\int F^{c(a+b x)} \operatorname{Sec}[d+e x]^n dx$$

Problem 27: Unable to integrate problem.

$$\int F^{c(a+b x)} \operatorname{Csc}[d+e x]^n dx$$

Optimal (type 5, 102 leaves, 2 steps):

$$\frac{1}{\frac{i e n - b c \operatorname{Log}[F]}{}} \left(1 - e^{-2 i (d+e x)}\right)^n F^{a c + b c x} \operatorname{Csc}[d+e x]^n \\ \operatorname{Hypergeometric2F1}\left[n, \frac{e n + i b c \operatorname{Log}[F]}{2 e}, \frac{1}{2} \left(2 + n + \frac{i b c \operatorname{Log}[F]}{e}\right), e^{-2 i (d+e x)}\right]$$

Result (type 8, 20 leaves):

$$\int F^{c(a+b x)} \operatorname{Csc}[d+e x]^n dx$$

Problem 63: Result more than twice size of optimal antiderivative.

$$\int e^x \operatorname{Csc}[e^x] \operatorname{Sec}[e^x] dx$$

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

$$\operatorname{Log}[\operatorname{Tan}[e^x]]$$

Result (type 3, 21 leaves):

$$2 \left(-\frac{1}{2} \operatorname{Log}[\operatorname{Cos}[e^x]] + \frac{1}{2} \operatorname{Log}[\operatorname{Sin}[e^x]]\right)$$

Problem 70: Result more than twice size of optimal antiderivative.

$$\int e^x \operatorname{Sec}[e^x] dx$$

Optimal (type 3, 5 leaves, 2 steps):

$$\operatorname{ArcTanh}[\operatorname{Sin}[e^x]]$$

Result (type 3, 41 leaves):

$$-\operatorname{Log}\left[\cos\left(\frac{e^x}{2}\right) - \sin\left(\frac{e^x}{2}\right)\right] + \operatorname{Log}\left[\cos\left(\frac{e^x}{2}\right) + \sin\left(\frac{e^x}{2}\right)\right]$$

Problem 93: Result more than twice size of optimal antiderivative.

$$\int f^{a+c x^2} \sin[d + e x + f x^2]^3 dx$$

Optimal (type 4, 377 leaves, 14 steps):

$$\begin{aligned} & \frac{3 i e^{-i d - \frac{e^2}{4 i f - 4 c \operatorname{Log}[f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{i e + 2 x (\pm f - c \operatorname{Log}[f])}{2 \sqrt{i f - c \operatorname{Log}[f]}}\right]}{16 \sqrt{i f - c \operatorname{Log}[f]}} - \\ & \frac{i e^{-3 i d - \frac{9 e^2}{4 (3 i f - c \operatorname{Log}[f])}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{3 i e + 2 x (3 \pm f - c \operatorname{Log}[f])}{2 \sqrt{3 i f - c \operatorname{Log}[f]}}\right]}{16 \sqrt{3 \pm f - c \operatorname{Log}[f]}} - \\ & \frac{3 i e^{i d + \frac{e^2}{4 i f + 4 c \operatorname{Log}[f]}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{i e + 2 x (\pm f + c \operatorname{Log}[f])}{2 \sqrt{i f + c \operatorname{Log}[f]}}\right]}{16 \sqrt{i f + c \operatorname{Log}[f]}} + \\ & \frac{i e^{3 i d + \frac{9 e^2}{4 (3 i f + c \operatorname{Log}[f])}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{3 i e + 2 x (3 \pm f + c \operatorname{Log}[f])}{2 \sqrt{3 i f + c \operatorname{Log}[f]}}\right]}{16 \sqrt{3 \pm f + c \operatorname{Log}[f]}} \end{aligned}$$

Result (type 4, 3003 leaves):

$$\begin{aligned} & \left(f^a \sqrt{\pi} \right. \\ & \left(-27 (-1)^{3/4} e^{-\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} f^3 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \pm c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right] \sqrt{f - i c \operatorname{Log}[f]} \right. + \\ & 27 (-1)^{1/4} c e^{-\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \pm c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right] \\ & \operatorname{Log}[f] \sqrt{f - i c \operatorname{Log}[f]} - 3 (-1)^{3/4} c^2 e^{-\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} f \cos[d] \\ & \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \pm c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f - i c \operatorname{Log}[f]} + \\ & 3 (-1)^{1/4} c^3 e^{-\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \pm c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right] \\ & \operatorname{Log}[f]^3 \sqrt{f - i c \operatorname{Log}[f]} + 3 (-1)^{3/4} e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} f^3 \cos[3 d] \end{aligned}$$

$$\begin{aligned}
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \sqrt{3 f - i c \operatorname{Log}[f]} - (-1)^{1/4} c e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} \\
& f^2 \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{3 f - i c \operatorname{Log}[f]} + \\
& 3 (-1)^{3/4} c^2 e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} f \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{3 f - i c \operatorname{Log}[f]} - (-1)^{1/4} c^3 e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{3 f - i c \operatorname{Log}[f]} + \\
& 27 (-1)^{1/4} e^{\frac{i e^2}{4 (f + i c \operatorname{Log}[f])}} f^3 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \sqrt{f + i c \operatorname{Log}[f]} - \\
& 27 (-1)^{3/4} c e^{\frac{i e^2}{4 (f + i c \operatorname{Log}[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{f + i c \operatorname{Log}[f]} + 3 (-1)^{1/4} c^2 e^{\frac{i e^2}{4 (f + i c \operatorname{Log}[f])}} f \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f + i c \operatorname{Log}[f]} - \\
& 3 (-1)^{3/4} c^3 e^{\frac{i e^2}{4 (f + i c \operatorname{Log}[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{f + i c \operatorname{Log}[f]} - 3 (-1)^{1/4} e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} f^3 \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \sqrt{3 f + i c \operatorname{Log}[f]} + (-1)^{3/4} c e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} \\
& f^2 \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{3 f + i c \operatorname{Log}[f]} - \\
& 3 (-1)^{1/4} c^2 e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} f \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{3 f + i c \operatorname{Log}[f]} + (-1)^{3/4} c^3 e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{3 f + i c \operatorname{Log}[f]} + \\
& 27 (-1)^{1/4} e^{\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} f^3 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right] \sqrt{f - i c \operatorname{Log}[f]} \sin[d] + \\
& 27 (-1)^{3/4} c e^{\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{f - i c \operatorname{Log}[f]} \\
& \sin[d] + 3 (-1)^{1/4} c^2 e^{\frac{i e^2}{4 (f - i c \operatorname{Log}[f])}} f \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{f - i c \operatorname{Log}[f]}}\right]
\end{aligned}$$

$$\begin{aligned}
& \operatorname{Log}[f]^2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] + 3 (-1)^{3/4} c^3 e^{-\frac{i e^2}{4(f-i c \operatorname{Log}[f])}} \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - \\
& 27 (-1)^{3/4} e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f^3 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - \\
& 27 (-1)^{1/4} c e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \\
& \operatorname{Sin}[d] - 3 (-1)^{3/4} c^2 e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - 3 (-1)^{1/4} c^3 e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - \\
& 3 (-1)^{1/4} e^{-\frac{9 i e^2}{4(3 f - \frac{i}{2} c \operatorname{Log}[f])}} f^3 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \\
& \operatorname{Sin}[3 d] - (-1)^{3/4} c e^{-\frac{9 i e^2}{4(3 f - \frac{i}{2} c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] - 3 (-1)^{1/4} c^2 e^{-\frac{9 i e^2}{4(3 f - \frac{i}{2} c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] - \\
& (-1)^{3/4} c^3 e^{-\frac{9 i e^2}{4(3 f - \frac{i}{2} c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + 3 (-1)^{3/4} e^{\frac{9 i e^2}{4(3 f + \frac{i}{2} c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + \\
& (-1)^{1/4} c e^{\frac{9 i e^2}{4(3 f + \frac{i}{2} c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \\
& \operatorname{Sin}[3 d] + 3 (-1)^{3/4} c^2 e^{\frac{9 i e^2}{4(3 f + \frac{i}{2} c \operatorname{Log}[f])}} f \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + (-1)^{1/4} c^3 e^{\frac{9 i e^2}{4(3 f + \frac{i}{2} c \operatorname{Log}[f])}} \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] \Big) \Big) \Big) / \\
& (16 \left(\frac{i}{2} f - c \operatorname{Log}[f]\right) \left(f - \frac{i}{2} c \operatorname{Log}[f]\right) \left(3 f - \frac{i}{2} c \operatorname{Log}[f]\right) \left(3 f + \frac{i}{2} c \operatorname{Log}[f]\right))
\end{aligned}$$

Problem 99: Result more than twice size of optimal antiderivative.

$$\int f^{a+b x+c x^2} \sin[d + f x^2]^3 dx$$

Optimal (type 4, 386 leaves, 14 steps):

$$\begin{aligned} & -\frac{3 i e^{-i d+\frac{b^2 \log [f]^2}{4 i f-4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{b \log [f]-2 x (\frac{i}{2} f-c \log [f])}{2 \sqrt{i f-c \log [f]}}\right]}{16 \sqrt{i f-c \log [f]}} + \\ & \frac{i e^{-3 i d+\frac{b^2 \log [f]^2}{12 i f-4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{b \log [f]-2 x (3 i f-c \log [f])}{2 \sqrt{3 i f-c \log [f]}}\right]}{16 \sqrt{3 i f-c \log [f]}} - \\ & \frac{3 i e^{i d-\frac{b^2 \log [f]^2}{4 i f+4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{b \log [f]+2 x (\frac{i}{2} f+c \log [f])}{2 \sqrt{i f+c \log [f]}}\right]}{16 \sqrt{i f+c \log [f]}} + \\ & \frac{i e^{3 i d-\frac{b^2 \log [f]^2}{4 (3 i f+c \log [f])}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{b \log [f]+2 x (3 i f+c \log [f])}{2 \sqrt{3 i f+c \log [f]}}\right]}{16 \sqrt{3 i f+c \log [f]}} \end{aligned}$$

Result (type 4, 3291 leaves):

$$\begin{aligned} & \left(f^a \sqrt{\pi} \left(-27 (-1)^{3/4} e^{\frac{i b^2 \log [f]^2}{4 (f-i c \log [f])}} f^3 \cos [d]\right.\right. \\ & \left.\left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \sqrt{f-i c \log [f]}\right)+\right. \\ & 27 (-1)^{1/4} c e^{\frac{i b^2 \log [f]^2}{4 (f-i c \log [f])}} f^2 \cos [d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \\ & \left.\left. \log [f] \sqrt{f-i c \log [f]}-3 (-1)^{3/4} c^2 e^{\frac{i b^2 \log [f]^2}{4 (f-i c \log [f])}} f \cos [d]\right.\right. \\ & \left.\left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \log [f]^2 \sqrt{f-i c \log [f]}\right)+\right. \\ & 3 (-1)^{1/4} c^3 e^{\frac{i b^2 \log [f]^2}{4 (f-i c \log [f])}} \cos [d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \\ & \left.\left. \log [f]^3 \sqrt{f-i c \log [f]}+3 (-1)^{3/4} e^{\frac{i b^2 \log [f]^2}{4 (3 f-i c \log [f])}} f^3 \cos [3 d]\right.\right. \\ & \left.\left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \sqrt{3 f-i c \log [f]}\right.-\right. \\ & \left.\left. (-1)^{1/4} c e^{\frac{i b^2 \log [f]^2}{4 (3 f-i c \log [f])}} f^2 \cos [3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right]\right.\right. \\ & \left.\left. \log [f] \sqrt{3 f-i c \log [f]}+3 (-1)^{3/4} c^2 e^{\frac{i b^2 \log [f]^2}{4 (3 f-i c \log [f])}} f \cos [3 d]\right.\right. \\ & \left.\left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \log [f]^2 \sqrt{3 f-i c \log [f]}\right.-\right. \end{aligned}$$

$$\begin{aligned}
& (-1)^{1/4} c^3 e^{\frac{i b^2 \log[f]^2}{4(3f - i c \log[f])}} \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6fx - i b \log[f] - 2i c x \log[f])}{2\sqrt{3f - i c \log[f]}}\right] \\
& \log[f]^3 \sqrt{3f - i c \log[f]} + 27 (-1)^{1/4} e^{\frac{-i b^2 \log[f]^2}{4(f + i c \log[f])}} f^3 \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{f + i c \log[f]}}\right] \sqrt{f + i c \log[f]} - \\
& 27 (-1)^{3/4} c e^{\frac{-i b^2 \log[f]^2}{4(f + i c \log[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{f + i c \log[f]}}\right] \\
& \log[f] \sqrt{f + i c \log[f]} + 3 (-1)^{1/4} c^2 e^{\frac{-i b^2 \log[f]^2}{4(f + i c \log[f])}} f \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{f + i c \log[f]}}\right] \log[f]^2 \sqrt{f + i c \log[f]} - \\
& 3 (-1)^{3/4} c^3 e^{\frac{-i b^2 \log[f]^2}{4(f + i c \log[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{f + i c \log[f]}}\right] \\
& \log[f]^3 \sqrt{f + i c \log[f]} - 3 (-1)^{1/4} e^{\frac{-i b^2 \log[f]^2}{4(3f + i c \log[f])}} f^3 \cos[3d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{3f + i c \log[f]}}\right] \sqrt{3f + i c \log[f]} + \\
& (-1)^{3/4} c e^{\frac{-i b^2 \log[f]^2}{4(3f + i c \log[f])}} f^2 \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{3f + i c \log[f]}}\right] \\
& \log[f] \sqrt{3f + i c \log[f]} - 3 (-1)^{1/4} c^2 e^{\frac{-i b^2 \log[f]^2}{4(3f + i c \log[f])}} f \cos[3d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{3f + i c \log[f]}}\right] \log[f]^2 \sqrt{3f + i c \log[f]} + \\
& (-1)^{3/4} c^3 e^{\frac{-i b^2 \log[f]^2}{4(3f + i c \log[f])}} \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6fx + i b \log[f] + 2i c x \log[f])}{2\sqrt{3f + i c \log[f]}}\right] \\
& \log[f]^3 \sqrt{3f + i c \log[f]} + 27 (-1)^{1/4} e^{\frac{i b^2 \log[f]^2}{4(f - i c \log[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2fx - i b \log[f] - 2i c x \log[f])}{2\sqrt{f - i c \log[f]}}\right] \sqrt{f - i c \log[f]} \sin[d] + \\
& 27 (-1)^{3/4} c e^{\frac{i b^2 \log[f]^2}{4(f - i c \log[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2fx - i b \log[f] - 2i c x \log[f])}{2\sqrt{f - i c \log[f]}}\right] \\
& \log[f] \sqrt{f - i c \log[f]} \sin[d] + 3 (-1)^{1/4} c^2 e^{\frac{i b^2 \log[f]^2}{4(f - i c \log[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2fx - i b \log[f] - 2i c x \log[f])}{2\sqrt{f - i c \log[f]}}\right] \log[f]^2 \sqrt{f - i c \log[f]} \sin[d] + \\
& 3 (-1)^{3/4} c^3 e^{\frac{i b^2 \log[f]^2}{4(f - i c \log[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2fx - i b \log[f] - 2i c x \log[f])}{2\sqrt{f - i c \log[f]}}\right] \\
& \log[f]^3 \sqrt{f - i c \log[f]} \sin[d] - 27 (-1)^{3/4} e^{\frac{-i b^2 \log[f]^2}{4(f + i c \log[f])}} f^3
\end{aligned}$$

$$\begin{aligned}
& \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - \\
& 27 \left(-1\right)^{1/4} c e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4 (f + \frac{i}{2} c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - 3 \left(-1\right)^{3/4} c^2 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4 (f + \frac{i}{2} c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - \\
& 3 \left(-1\right)^{1/4} c^3 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4 (f + \frac{i}{2} c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[d] - 3 \left(-1\right)^{1/4} e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f - \frac{i}{2} c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{\left(-1\right)^{1/4} \left(6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] - \\
& \left(-1\right)^{3/4} c e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f - \frac{i}{2} c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{\left(-1\right)^{1/4} \left(6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] - 3 \left(-1\right)^{1/4} c^2 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f - \frac{i}{2} c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{\left(-1\right)^{1/4} \left(6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] - \\
& \left(-1\right)^{3/4} c^3 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f - \frac{i}{2} c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{\left(-1\right)^{1/4} \left(6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + 3 \left(-1\right)^{3/4} e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f + \frac{i}{2} c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + \\
& \left(-1\right)^{1/4} c e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f + \frac{i}{2} c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + 3 \left(-1\right)^{3/4} c^2 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f + \frac{i}{2} c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] + \\
& \left(-1\right)^{1/4} c^3 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4 (3 f + \frac{i}{2} c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{\left(-1\right)^{3/4} \left(6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f]\right)}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \operatorname{Sin}[3 d] \Bigg) \Bigg) \Bigg) \\
& (16 \left(\frac{i}{2} f - c \operatorname{Log}[f]\right) \left(f - \frac{i}{2} c \operatorname{Log}[f]\right) \left(3 f - \frac{i}{2} c \operatorname{Log}[f]\right) \left(3 f + \frac{i}{2} c \operatorname{Log}[f]\right))
\end{aligned}$$

Problem 101: Result more than twice size of optimal antiderivative.

$$\int f^{a+b x+c x^2} \sin[d + e x + f x^2]^2 dx$$

Optimal (type 4, 268 leaves, 10 steps):

$$\frac{\begin{aligned} & f^{a-\frac{b^2}{4c}} \sqrt{\pi} \operatorname{Erfi}\left[\frac{(b+2cx)\sqrt{\log[f]}}{2\sqrt{c}}\right] - e^{-2i d - \frac{(2e+ib\log[f])^2}{8if+4c\log[f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{2ie-b\log[f]+2x(2if-c\log[f])}{2\sqrt{2if-c\log[f]}}\right] \\ & \hline 4\sqrt{c}\sqrt{\log[f]} \end{aligned}}{8\sqrt{2if-c\log[f]}}$$

$$\frac{\begin{aligned} & e^{2id + \frac{(2e-ib\log[f])^2}{8if+4c\log[f]}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{2ie+b\log[f]+2x(2if+c\log[f])}{2\sqrt{2if+c\log[f]}}\right] \\ & \hline 8\sqrt{2if+c\log[f]} \end{aligned}}{8\sqrt{2if+c\log[f]}}$$

Result (type 4, 1120 leaves):

$$\begin{aligned}
& \frac{1}{8 c \operatorname{Log}[f] (2 f - i c \operatorname{Log}[f]) (2 f + i c \operatorname{Log}[f])} \\
& f^a \sqrt{\pi} \left(8 \sqrt{c} f^{2-\frac{b^2}{4c}} \operatorname{Erfi} \left[\frac{(b+2 c x) \sqrt{\operatorname{Log}[f]}}{2 \sqrt{c}} \right] \sqrt{\operatorname{Log}[f]} + \right. \\
& 2 c^{5/2} f^{-\frac{b^2}{4c}} \operatorname{Erfi} \left[\frac{(b+2 c x) \sqrt{\operatorname{Log}[f]}}{2 \sqrt{c}} \right] \operatorname{Log}[f]^{5/2} + 2 (-1)^{1/4} c e^{\frac{i (-4 e^2 + 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f - i c \operatorname{Log}[f])}} f \cos[2 d] \\
& \operatorname{Erf} \left[\frac{(-1)^{3/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f] \sqrt{2 f - i c \operatorname{Log}[f]} + \\
& (-1)^{3/4} c^2 e^{\frac{i (-4 e^2 + 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f - i c \operatorname{Log}[f])}} \cos[2 d] \operatorname{Erf} \left[\frac{(-1)^{3/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f]^2 \sqrt{2 f - i c \operatorname{Log}[f]} + 2 (-1)^{3/4} c e^{-\frac{i (-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f + i c \operatorname{Log}[f])}} f \cos[2 d] \\
& \operatorname{Erf} \left[\frac{(-1)^{1/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f] \sqrt{2 f + i c \operatorname{Log}[f]} + \\
& (-1)^{1/4} c^2 e^{-\frac{i (-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f + i c \operatorname{Log}[f])}} \cos[2 d] \operatorname{Erf} \left[\frac{(-1)^{1/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f]^2 \sqrt{2 f + i c \operatorname{Log}[f]} + 2 (-1)^{3/4} c e^{\frac{i (-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f - i c \operatorname{Log}[f])}} f \\
& \operatorname{Erf} \left[\frac{(-1)^{3/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f] \sqrt{2 f - i c \operatorname{Log}[f]} \sin[2 d] - \\
& (-1)^{1/4} c^2 e^{\frac{i (-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f - i c \operatorname{Log}[f])}} \operatorname{Erf} \left[\frac{(-1)^{3/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f]^2 \sqrt{2 f - i c \operatorname{Log}[f]} \sin[2 d] + 2 (-1)^{1/4} c e^{-\frac{i (-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f + i c \operatorname{Log}[f])}} f \\
& \operatorname{Erf} \left[\frac{(-1)^{1/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f] \sqrt{2 f + i c \operatorname{Log}[f]} \sin[2 d] - \\
& (-1)^{3/4} c^2 e^{-\frac{i (-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4 (2 f + i c \operatorname{Log}[f])}} \operatorname{Erf} \left[\frac{(-1)^{1/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f]^2 \sqrt{2 f + i c \operatorname{Log}[f]} \sin[2 d]
\end{aligned}$$

Problem 102: Result more than twice size of optimal antiderivative.

$$\int f^{a+b x+c x^2} \sin[d+e x+f x^2]^3 dx$$

Optimal (type 4, 430 leaves, 14 steps):

$$\begin{aligned}
& \frac{3 i e^{-i d-\frac{(e+i b \log [f])^2}{4 i f-4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{i e-b \log [f]+2 x (i f-c \log [f])}{2 \sqrt{i f-c \log [f]}}\right]}{16 \sqrt{i f-c \log [f]}} \\
& + \frac{i e^{-3 i d-\frac{(3 e+i b \log [f])^2}{4 (3 i f-c \log [f])}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{3 i e-b \log [f]+2 x (3 i f-c \log [f])}{2 \sqrt{3 i f-c \log [f]}}\right]}{16 \sqrt{3 i f-c \log [f]}} \\
& + \frac{3 i e^{i d+\frac{(e-i b \log [f])^2}{4 i f-4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{i e+b \log [f]+2 x (i f+c \log [f])}{2 \sqrt{i f+c \log [f]}}\right]}{16 \sqrt{i f+c \log [f]}} \\
& + \frac{i e^{3 i d-\frac{(3 i e+b \log [f])^2}{4 (3 i f+c \log [f])}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{3 i e+b \log [f]+2 x (3 i f+c \log [f])}{2 \sqrt{3 i f+c \log [f]}}\right]}{16 \sqrt{3 i f+c \log [f]}}
\end{aligned}$$

Result (type 4, 3835 leaves) :

$$\begin{aligned}
& \left(f^a \sqrt{\pi} \right. \\
& \left(-27 (-1)^{3/4} e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} f^3 \cos [d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \right. \\
& \left. \sqrt{f-i c \log [f]}+27 (-1)^{1/4} c e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} f^2 \cos [d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \log [f] \sqrt{f-i c \log [f]}- \right. \\
& \left. 3 (-1)^{3/4} c^2 e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} f \cos [d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \log [f]^2 \sqrt{f-i c \log [f]}+ \right. \\
& \left. 3 (-1)^{1/4} c^3 e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} \cos [d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \right. \\
& \left. \log [f]^3 \sqrt{f-i c \log [f]}+3 (-1)^{3/4} e^{\frac{i(-9 e^2+6 i b e \log [f]+b^2 \log [f]^2)}{4(3 f-i c \log [f])}} f^3 \cos [3 d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e+6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \sqrt{3 f-i c \log [f]}-(-1)^{1/4} c \right. \\
& \left. e^{\frac{i(-9 e^2+6 i b e \log [f]+b^2 \log [f]^2)}{4(3 f-i c \log [f])}} f^2 \cos [3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e+6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \right. \\
& \left. \log [f] \sqrt{3 f-i c \log [f]}+3 (-1)^{3/4} c^2 e^{\frac{i(-9 e^2+6 i b e \log [f]+b^2 \log [f]^2)}{4(3 f-i c \log [f])}} f \cos [3 d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e+6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \log [f]^2 \sqrt{3 f-i c \log [f]}-(-1)^{1/4} \right)
\end{aligned}$$

$$\begin{aligned}
& c^3 e^{\frac{i(-9e^2+6ib\log[f]+b^2\log[f]^2)}{4(3f-i\log[f])}} \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3e+6fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{3f-\frac{i}{2}c\log[f]}}\right] \\
& \log[f]^3 \sqrt{3f-\frac{i}{2}c\log[f]} + 27 (-1)^{1/4} e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} f^3 \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \sqrt{f+\frac{i}{2}c\log[f]} - 27 (-1)^{3/4} c \\
& e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f] \sqrt{f+\frac{i}{2}c\log[f]} + 3 (-1)^{1/4} c^2 e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} f \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \log[f]^2 \sqrt{f+\frac{i}{2}c\log[f]} - \\
& 3 (-1)^{3/4} c^3 e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f]^3 \sqrt{f+\frac{i}{2}c\log[f]} - 3 (-1)^{1/4} e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} f^3 \cos[3d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \sqrt{3f+\frac{i}{2}c\log[f]} + (-1)^{3/4} c \\
& e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} f^2 \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f] \sqrt{3f+\frac{i}{2}c\log[f]} - 3 (-1)^{1/4} c^2 e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} f \cos[3d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \log[f]^2 \sqrt{3f+\frac{i}{2}c\log[f]} + (-1)^{3/4} \\
& c^3 e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f]^3 \sqrt{3f+\frac{i}{2}c\log[f]} + 27 (-1)^{1/4} e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right] \sqrt{f-\frac{i}{2}c\log[f]} \sin[d] + \\
& 27 (-1)^{3/4} c e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right] \\
& \log[f] \sqrt{f-\frac{i}{2}c\log[f]} \sin[d] + 3 (-1)^{1/4} c^2 e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right] \log[f]^2 \sqrt{f-\frac{i}{2}c\log[f]} \sin[d] + \\
& 3 (-1)^{3/4} c^3 e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right]
\end{aligned}$$

$$\begin{aligned}
& \text{Log}[f]^3 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \sin[d] - 27 (-1)^{3/4} e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f+i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] - \\
& 27 (-1)^{1/4} c e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f+i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] - 3 (-1)^{3/4} c^2 e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f+i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \text{Log}[f]^2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] - \\
& 3 (-1)^{1/4} c^3 e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f+i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f]^3 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] - 3 (-1)^{1/4} e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] - \\
& (-1)^{3/4} c e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] - 3 (-1)^{1/4} c^2 e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \text{Log}[f]^2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] - \\
& (-1)^{3/4} c^3 e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f]^3 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} c^2 e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \text{Log}[f]^2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c^3 e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f]^3 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] \Bigg) \Bigg)
\end{aligned}$$

/16 / i f - r I n o r f 1) / f - i c I n o r f 1) / 2 f - i r I n o r f 1) / 2 f + i c I n o r f 1))

Problem 124: Result more than twice size of optimal antiderivative.

$$\int f^{a+c x^2} \cos[d + e x + f x^2]^3 dx$$

Optimal (type 4, 369 leaves, 14 steps):

$$\begin{aligned} & \frac{3 e^{-\frac{i d - \frac{e^2}{4 i f - 4 c \log[f]}}{f^a \sqrt{\pi}} \operatorname{Erf}\left[\frac{i e + 2 x (\frac{i}{2} f - c \log[f])}{2 \sqrt{i f - c \log[f]}}\right]} + e^{-\frac{3 i d - \frac{9 e^2}{4 (3 i f - c \log[f])}}{f^a \sqrt{\pi}} \operatorname{Erf}\left[\frac{3 i e + 2 x (3 \frac{i}{2} f - c \log[f])}{2 \sqrt{3 i f - c \log[f]}}\right]} + \\ & \frac{16 \sqrt{i f - c \log[f]}}{16 \sqrt{3 i f - c \log[f]}} \\ & \frac{3 e^{\frac{i d + \frac{e^2}{4 i f + 4 c \log[f]}}{f^a \sqrt{\pi}} \operatorname{Erfi}\left[\frac{i e + 2 x (i f + c \log[f])}{2 \sqrt{i f + c \log[f]}}\right]} + e^{\frac{3 i d + \frac{9 e^2}{4 (3 i f + c \log[f])}}{f^a \sqrt{\pi}} \operatorname{Erfi}\left[\frac{3 i e + 2 x (3 i f + c \log[f])}{2 \sqrt{3 i f + c \log[f]}}\right]} + \\ & \frac{16 \sqrt{i f + c \log[f]}}{16 \sqrt{3 i f + c \log[f]}} \end{aligned}$$

Result (type 4, 2997 leaves):

$$\begin{aligned} & \left(f^a \sqrt{\pi} \right. \\ & \left(-27 (-1)^{3/4} e^{-\frac{i e^2}{4 (f - i c \log[f])}} f^3 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{f - \frac{i}{2} c \log[f]}}\right] \sqrt{f - \frac{i}{2} c \log[f]} \right. + \\ & 27 (-1)^{1/4} c e^{-\frac{i e^2}{4 (f - i c \log[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{f - \frac{i}{2} c \log[f]}}\right] \\ & \operatorname{Log}[f] \sqrt{f - \frac{i}{2} c \log[f]} - 3 (-1)^{3/4} c^2 e^{-\frac{i e^2}{4 (f - i c \log[f])}} f \cos[d] \\ & \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{f - \frac{i}{2} c \log[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f - \frac{i}{2} c \log[f]} + \\ & 3 (-1)^{1/4} c^3 e^{-\frac{i e^2}{4 (f - i c \log[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e + 2 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{f - \frac{i}{2} c \log[f]}}\right] \\ & \operatorname{Log}[f]^3 \sqrt{f - \frac{i}{2} c \log[f]} - 3 (-1)^{3/4} e^{-\frac{9 i e^2}{4 (3 f - i c \log[f])}} f^3 \cos[3 d] \\ & \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{3 f - \frac{i}{2} c \log[f]}}\right] \sqrt{3 f - \frac{i}{2} c \log[f]} + (-1)^{1/4} c e^{-\frac{9 i e^2}{4 (3 f - i c \log[f])}} \\ & f^2 \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{3 f - \frac{i}{2} c \log[f]}}\right] \operatorname{Log}[f] \sqrt{3 f - \frac{i}{2} c \log[f]} - \\ & 3 (-1)^{3/4} c^2 e^{-\frac{9 i e^2}{4 (3 f - i c \log[f])}} f \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{3 f - \frac{i}{2} c \log[f]}}\right] \\ & \operatorname{Log}[f]^2 \sqrt{3 f - \frac{i}{2} c \log[f]} + (-1)^{1/4} c^3 e^{-\frac{9 i e^2}{4 (3 f - i c \log[f])}} \cos[3 d] \\ & \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 \frac{i}{2} c x \log[f])}{2 \sqrt{3 f - \frac{i}{2} c \log[f]}}\right] \operatorname{Log}[f]^3 \sqrt{3 f - \frac{i}{2} c \log[f]} - \\ & 27 (-1)^{1/4} e^{\frac{i e^2}{4 (f + i c \log[f])}} f^3 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 \frac{i}{2} c x \log[f])}{2 \sqrt{f + \frac{i}{2} c \log[f]}}\right] \sqrt{f + \frac{i}{2} c \log[f]} + \end{aligned}$$

$$\begin{aligned}
& 27 (-1)^{3/4} c e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{f+i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{f+i c \operatorname{Log}[f]} - 3 (-1)^{1/4} c^2 e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{f+i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f+i c \operatorname{Log}[f]} + \\
& 3 (-1)^{3/4} c^3 e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{f+i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{f+i c \operatorname{Log}[f]} - 3 (-1)^{1/4} e^{\frac{9 i e^2}{4(3 f+i c \operatorname{Log}[f])}} f^3 \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e+6 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f+i c \operatorname{Log}[f]}}\right] \sqrt{3 f+i c \operatorname{Log}[f]} + (-1)^{3/4} c e^{\frac{9 i e^2}{4(3 f+i c \operatorname{Log}[f])}} \\
& f^2 \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e+6 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f+i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{3 f+i c \operatorname{Log}[f]} - \\
& 3 (-1)^{1/4} c^2 e^{\frac{9 i e^2}{4(3 f+i c \operatorname{Log}[f])}} f \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e+6 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f+i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{3 f+i c \operatorname{Log}[f]} + (-1)^{3/4} c^3 e^{\frac{9 i e^2}{4(3 f+i c \operatorname{Log}[f])}} \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e+6 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f+i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{3 f+i c \operatorname{Log}[f]} + \\
& 27 (-1)^{1/4} e^{-\frac{i e^2}{4(f-i c \operatorname{Log}[f])}} f^3 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-2 i c x \operatorname{Log}[f])}{2 \sqrt{f-i c \operatorname{Log}[f]}}\right] \sqrt{f-i c \operatorname{Log}[f]} \sin[d] + \\
& 27 (-1)^{3/4} c e^{-\frac{i e^2}{4(f-i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-2 i c x \operatorname{Log}[f])}{2 \sqrt{f-i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{f-i c \operatorname{Log}[f]} \\
& \sin[d] + 3 (-1)^{1/4} c^2 e^{-\frac{i e^2}{4(f-i c \operatorname{Log}[f])}} f \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-2 i c x \operatorname{Log}[f])}{2 \sqrt{f-i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{f-i c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{3/4} c^3 e^{-\frac{i e^2}{4(f-i c \operatorname{Log}[f])}} \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2 f x-2 i c x \operatorname{Log}[f])}{2 \sqrt{f-i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{f-i c \operatorname{Log}[f]} \sin[d] + \\
& 27 (-1)^{3/4} e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f^3 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{f+i c \operatorname{Log}[f]}}\right] \sqrt{f+i c \operatorname{Log}[f]} \sin[d] + \\
& 27 (-1)^{1/4} c e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{f+i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{f+i c \operatorname{Log}[f]} \\
& \sin[d] + 3 (-1)^{3/4} c^2 e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}} f \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2 f x+2 i c x \operatorname{Log}[f])}{2 \sqrt{f+i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{f+i c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{1/4} c^3 e^{\frac{i e^2}{4(f+i c \operatorname{Log}[f])}}
\end{aligned}$$

$$\begin{aligned}
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{f + i c \operatorname{Log}[f]} \sin[d] + \\
& 3 (-1)^{1/4} e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} f^3 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \sqrt{3 f - i c \operatorname{Log}[f]} \\
& \sin[3 d] + (-1)^{3/4} c e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{1/4} c^2 e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{3/4} c^3 e^{-\frac{9 i e^2}{4 (3 f - i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f] \sqrt{3 f + i c \operatorname{Log}[f]} \\
& \sin[3 d] + 3 (-1)^{3/4} c^2 e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} f \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^2 \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] + (-1)^{1/4} c^3 e^{\frac{9 i e^2}{4 (3 f + i c \operatorname{Log}[f])}} \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^3 \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] \Bigg) \Bigg) / \\
& (16 (f - i c \operatorname{Log}[f]) (3 f - i c \operatorname{Log}[f]) (f + i c \operatorname{Log}[f]) (3 f + i c \operatorname{Log}[f]))
\end{aligned}$$

Problem 130: Result more than twice size of optimal antiderivative.

$$\int f^{a+b x+c x^2} \cos[d + f x^2]^3 dx$$

Optimal (type 4, 378 leaves, 14 steps):

$$\begin{aligned}
& -\frac{3 e^{-\frac{i d}{4}+\frac{b^2 \operatorname{Log}[f]^2}{4 i f-4 c \operatorname{Log}[f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{b \operatorname{Log}[f]-2 x (\operatorname{i} f-c \operatorname{Log}[f])}{2 \sqrt{\operatorname{i} f-c \operatorname{Log}[f]}}\right]}{16 \sqrt{\operatorname{i} f-c \operatorname{Log}[f]}} \\
& +\frac{e^{-\frac{3 i d}{12}+\frac{b^2 \operatorname{Log}[f]^2}{12 i f-4 c \operatorname{Log}[f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{b \operatorname{Log}[f]-2 x (3 \operatorname{i} f-c \operatorname{Log}[f])}{2 \sqrt{3 i f-c \operatorname{Log}[f]}}\right]}{16 \sqrt{3 \operatorname{i} f-c \operatorname{Log}[f]}} \\
& +\frac{3 e^{\frac{i d}{4}-\frac{b^2 \operatorname{Log}[f]^2}{4 i f+4 c \operatorname{Log}[f]}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{b \operatorname{Log}[f]+2 x (\operatorname{i} f+c \operatorname{Log}[f])}{2 \sqrt{\operatorname{i} f+c \operatorname{Log}[f]}}\right]}{16 \sqrt{\operatorname{i} f+c \operatorname{Log}[f]}} \\
& +\frac{e^{\frac{3 i d}{4}-\frac{b^2 \operatorname{Log}[f]^2}{4 (3 i f+c \operatorname{Log}[f])}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{b \operatorname{Log}[f]+2 x (3 \operatorname{i} f+c \operatorname{Log}[f])}{2 \sqrt{3 \operatorname{i} f+c \operatorname{Log}[f]}}\right]}{16 \sqrt{3 \operatorname{i} f+c \operatorname{Log}[f]}}
\end{aligned}$$

Result (type 4, 3285 leaves) :

$$\begin{aligned}
& \left(f^a \sqrt{\pi} \left(-27 (-1)^{3/4} e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{f-i c \operatorname{Log}[f]}} f^3 \cos[d] \right. \right. \\
& \quad \left. \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{f - \operatorname{i} c \operatorname{Log}[f]}}\right] \sqrt{f - \operatorname{i} c \operatorname{Log}[f]} \right) + \right. \\
& \quad 27 (-1)^{1/4} c e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{f-i c \operatorname{Log}[f]}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{f - \operatorname{i} c \operatorname{Log}[f]}}\right] \\
& \quad \left. \operatorname{Log}[f] \sqrt{f - \operatorname{i} c \operatorname{Log}[f]} - 3 (-1)^{3/4} c^2 e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{f-i c \operatorname{Log}[f]}} f \cos[d] \right. \\
& \quad \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{f - \operatorname{i} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f - \operatorname{i} c \operatorname{Log}[f]} \right. \\
& \quad \left. 3 (-1)^{1/4} c^3 e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{f-i c \operatorname{Log}[f]}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{f - \operatorname{i} c \operatorname{Log}[f]}}\right] \right. \\
& \quad \left. \operatorname{Log}[f]^3 \sqrt{f - \operatorname{i} c \operatorname{Log}[f]} - 3 (-1)^{3/4} e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{3 f-i c \operatorname{Log}[f]}} f^3 \cos[3 d] \right. \\
& \quad \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]}}\right] \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]} \right. \\
& \quad \left. (-1)^{1/4} c e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{3 f-i c \operatorname{Log}[f]}} f^2 \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]}}\right] \right. \\
& \quad \left. \operatorname{Log}[f] \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]} - 3 (-1)^{3/4} c^2 e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{3 f-i c \operatorname{Log}[f]}} f \cos[3 d] \right. \\
& \quad \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]} \right. \\
& \quad \left. (-1)^{1/4} c^3 e^{\frac{\frac{1}{4} b^2 \operatorname{Log}[f]^2}{3 f-i c \operatorname{Log}[f]}} \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - \operatorname{i} b \operatorname{Log}[f] - 2 \operatorname{i} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \operatorname{i} c \operatorname{Log}[f]}}\right] \right)
\end{aligned}$$

$$\begin{aligned}
& \operatorname{Log}[f]^3 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} - 27 (-1)^{1/4} e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} f^3 \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} + \\
& 27 (-1)^{3/4} c e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} - 3 (-1)^{1/4} c^2 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} f \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} + \\
& 3 (-1)^{3/4} c^3 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} - 3 (-1)^{1/4} e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f+i c \operatorname{Log}[f])}} f^3 \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} + \\
& (-1)^{3/4} c e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f+i c \operatorname{Log}[f])}} f^2 \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} - 3 (-1)^{1/4} c^2 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f+i c \operatorname{Log}[f])}} f \cos[3 d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} + \\
& (-1)^{3/4} c^3 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f+i c \operatorname{Log}[f])}} \cos[3 d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} + 27 (-1)^{1/4} e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(f-i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + \\
& 27 (-1)^{3/4} c e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(f-i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{1/4} c^2 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(f-i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + \\
& 3 (-1)^{3/4} c^3 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(f-i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (2 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + 27 (-1)^{3/4} e^{\frac{-i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] +
\end{aligned}$$

$$\begin{aligned}
& 27 (-1)^{1/4} c e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{f + i c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{3/4} c^2 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f-i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{f + i c \operatorname{Log}[f]} \sin[d] + \\
& 3 (-1)^{1/4} c^3 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(f+i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{3/4} (2 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{f + i c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{1/4} e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f - i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{3/4} c e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f - i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{1/4} c^2 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f - i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{3/4} c^3 e^{\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f - i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (6 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f - i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f - i c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f + i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f + i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f] \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} c^2 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f + i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \operatorname{Log}[f]^2 \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c^3 e^{-\frac{i b^2 \operatorname{Log}[f]^2}{4(3 f + i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{3/4} (6 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{3 f + i c \operatorname{Log}[f]}}\right] \\
& \operatorname{Log}[f]^3 \sqrt{3 f + i c \operatorname{Log}[f]} \sin[3 d] \Bigg) \Bigg) / \\
& (16 (f - i c \operatorname{Log}[f]) (3 f - i c \operatorname{Log}[f]) (f + i c \operatorname{Log}[f]) (3 f + i c \operatorname{Log}[f]))
\end{aligned}$$

Problem 132: Result more than twice size of optimal antiderivative.

$$\int f^{a+b x+c x^2} \cos[d+e x+f x^2]^2 dx$$

Optimal (type 4, 268 leaves, 10 steps):

$$\frac{\frac{f^{a-\frac{b^2}{4c}} \sqrt{\pi} \operatorname{Erfi}\left[\frac{(b+2cx)\sqrt{\log(f)}}{2\sqrt{c}}\right]}{4\sqrt{c}\sqrt{\log(f)}} + \frac{e^{-2i d - \frac{(2e+ib\log(f))^2}{8if-4c\log(f)}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{2ie-b\log(f)+2x(2if-c\log(f))}{2\sqrt{2if-c\log(f)}}\right]}{8\sqrt{2if-c\log(f)}} + \frac{e^{2i d + \frac{(2e-ib\log(f))^2}{8if+4c\log(f)}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{2ie+b\log(f)+2x(2if+c\log(f))}{2\sqrt{2if+c\log(f)}}\right]}{8\sqrt{2if+c\log(f)}}}{}$$

Result (type 4, 1118 leaves):

$$\begin{aligned}
& \frac{1}{8 c \operatorname{Log}[f] (2 f - i c \operatorname{Log}[f]) (2 f + i c \operatorname{Log}[f])} \\
& f^a \sqrt{\pi} \left(8 \sqrt{c} f^{2 - \frac{b^2}{4c}} \operatorname{Erfi} \left[\frac{(b + 2 c x) \sqrt{\operatorname{Log}[f]}}{2 \sqrt{c}} \right] \sqrt{\operatorname{Log}[f]} + \right. \\
& 2 c^{5/2} f^{-\frac{b^2}{4c}} \operatorname{Erfi} \left[\frac{(b + 2 c x) \sqrt{\operatorname{Log}[f]}}{2 \sqrt{c}} \right] \operatorname{Log}[f]^{5/2} - 2 (-1)^{3/4} c e^{\frac{i(-4 e^2 + 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f - i c \operatorname{Log}[f])}} f \cos[2 d] \\
& \operatorname{Erfi} \left[\frac{(-1)^{1/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f] \sqrt{2 f - i c \operatorname{Log}[f]} + \\
& (-1)^{1/4} c^2 e^{\frac{i(-4 e^2 + 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f - i c \operatorname{Log}[f])}} \cos[2 d] \operatorname{Erfi} \left[\frac{(-1)^{1/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f]^2 \sqrt{2 f - i c \operatorname{Log}[f]} - 2 (-1)^{1/4} c e^{-\frac{i(-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f + i c \operatorname{Log}[f])}} f \cos[2 d] \\
& \operatorname{Erfi} \left[\frac{(-1)^{3/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f] \sqrt{2 f + i c \operatorname{Log}[f]} + \\
& (-1)^{3/4} c^2 e^{-\frac{i(-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f + i c \operatorname{Log}[f])}} \cos[2 d] \\
& \operatorname{Erfi} \left[\frac{(-1)^{3/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f]^2 \sqrt{2 f + i c \operatorname{Log}[f]} + \\
& 2 (-1)^{1/4} c e^{\frac{i(-4 e^2 + 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f - i c \operatorname{Log}[f])}} f \operatorname{Erfi} \left[\frac{(-1)^{1/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f] \sqrt{2 f - i c \operatorname{Log}[f]} \sin[2 d] + (-1)^{3/4} c^2 e^{\frac{i(-4 e^2 + 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f - i c \operatorname{Log}[f])}} \\
& \operatorname{Erfi} \left[\frac{(-1)^{1/4} (2 e + 4 f x - i b \operatorname{Log}[f] - 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f - i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f]^2 \sqrt{2 f - i c \operatorname{Log}[f]} \sin[2 d] + \\
& 2 (-1)^{3/4} c e^{-\frac{i(-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f + i c \operatorname{Log}[f])}} f \operatorname{Erfi} \left[\frac{(-1)^{3/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \\
& \operatorname{Log}[f] \sqrt{2 f + i c \operatorname{Log}[f]} \sin[2 d] + (-1)^{1/4} c^2 e^{-\frac{i(-4 e^2 - 4 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(2 f + i c \operatorname{Log}[f])}} \\
& \operatorname{Erfi} \left[\frac{(-1)^{3/4} (2 e + 4 f x + i b \operatorname{Log}[f] + 2 i c x \operatorname{Log}[f])}{2 \sqrt{2 f + i c \operatorname{Log}[f]}} \right] \operatorname{Log}[f]^2 \sqrt{2 f + i c \operatorname{Log}[f]} \sin[2 d]
\end{aligned}$$

Problem 133: Result more than twice size of optimal antiderivative.

$$\int f^{a+b x+c x^2} \cos[d + e x + f x^2]^3 dx$$

Optimal (type 4, 422 leaves, 14 steps):

$$\begin{aligned}
& \frac{3 e^{-\frac{i d}{4 i f-4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{i e-b \log [f]+2 x(i f-c \log [f])}{2 \sqrt{i f-c \log [f]}}\right]}{16 \sqrt{i f-c \log [f]}} + \\
& \frac{e^{-\frac{3 i d}{4(3 i f-c \log [f])}} f^a \sqrt{\pi} \operatorname{Erf}\left[\frac{3 i e-b \log [f]+2 x(3 i f-c \log [f])}{2 \sqrt{3 i f-c \log [f]}}\right]}{16 \sqrt{3 i f-c \log [f]}} + \\
& \frac{3 e^{\frac{i d}{4 i f+4 c \log [f]}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{i e+b \log [f]+2 x(i f+c \log [f])}{2 \sqrt{i f+c \log [f]}}\right]}{16 \sqrt{i f+c \log [f]}} + \\
& \frac{e^{\frac{3 i d}{4(3 i f+c \log [f])}} f^a \sqrt{\pi} \operatorname{Erfi}\left[\frac{3 i e+b \log [f]+2 x(3 i f+c \log [f])}{2 \sqrt{3 i f+c \log [f]}}\right]}{16 \sqrt{3 i f+c \log [f]}}
\end{aligned}$$

Result (type 4, 3829 leaves) :

$$\begin{aligned}
& \left\{ f^a \sqrt{\pi} \right. \\
& \left(-27 (-1)^{3/4} e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} f^3 \cos [d] \operatorname{Erfi}\left[\frac{(-1)^{1/4}(e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \right. \\
& \left. \sqrt{f-i c \log [f]}+27(-1)^{1/4} c e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} f^2 \cos [d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4}(e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \log [f] \sqrt{f-i c \log [f]}- \right. \\
& \left. 3(-1)^{3/4} c^2 e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} f \cos [d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4}(e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \log [f]^2 \sqrt{f-i c \log [f]}+ \right. \\
& \left. 3(-1)^{1/4} c^3 e^{\frac{i(-e^2+2 i b e \log [f]+b^2 \log [f]^2)}{4(f-i c \log [f])}} \cos [d] \operatorname{Erfi}\left[\frac{(-1)^{1/4}(e+2 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{f-i c \log [f]}}\right] \right. \\
& \left. \log [f]^3 \sqrt{f-i c \log [f]}-3(-1)^{3/4} e^{\frac{i(-9 e^2+6 i b e \log [f]+b^2 \log [f]^2)}{4(3 f-i c \log [f])}} f^3 \cos [3 d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4}(3 e+6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \sqrt{3 f-i c \log [f]}+(-1)^{1/4} c \right. \\
& \left. e^{\frac{i(-9 e^2+6 i b e \log [f]+b^2 \log [f]^2)}{4(3 f-i c \log [f])}} f^2 \cos [3 d] \operatorname{Erfi}\left[\frac{(-1)^{1/4}(3 e+6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \right. \\
& \left. \log [f] \sqrt{3 f-i c \log [f]}-3(-1)^{3/4} c^2 e^{\frac{i(-9 e^2+6 i b e \log [f]+b^2 \log [f]^2)}{4(3 f-i c \log [f])}} f \cos [3 d] \right. \\
& \left. \operatorname{Erfi}\left[\frac{(-1)^{1/4}(3 e+6 f x-i b \log [f]-2 i c x \log [f])}{2 \sqrt{3 f-i c \log [f]}}\right] \log [f]^2 \sqrt{3 f-i c \log [f]}+(-1)^{1/4} \right)
\end{aligned}$$

$$\begin{aligned}
& c^3 e^{\frac{i(-9e^2+6ib\log[f]+b^2\log[f]^2)}{4(3f-i\log[f])}} \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3e+6fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{3f-\frac{i}{2}c\log[f]}}\right] \\
& \log[f]^3 \sqrt{3f-\frac{i}{2}c\log[f]} - 27 (-1)^{1/4} e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} f^3 \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \sqrt{f+\frac{i}{2}c\log[f]} + 27 (-1)^{3/4} c \\
& e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} f^2 \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f] \sqrt{f+\frac{i}{2}c\log[f]} - 3 (-1)^{1/4} c^2 e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} f \cos[d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \log[f]^2 \sqrt{f+\frac{i}{2}c\log[f]} + \\
& 3 (-1)^{3/4} c^3 e^{\frac{i(-e^2-2ib\log[f]+b^2\log[f]^2)}{4(f+i\log[f])}} \cos[d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e+2fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f]^3 \sqrt{f+\frac{i}{2}c\log[f]} - 3 (-1)^{1/4} e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} f^3 \cos[3d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \sqrt{3f+\frac{i}{2}c\log[f]} + (-1)^{3/4} c \\
& e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} f^2 \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f] \sqrt{3f+\frac{i}{2}c\log[f]} - 3 (-1)^{1/4} c^2 e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} f \cos[3d] \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \log[f]^2 \sqrt{3f+\frac{i}{2}c\log[f]} + (-1)^{3/4} \\
& c^3 e^{\frac{i(-9e^2-6ib\log[f]+b^2\log[f]^2)}{4(3f+i\log[f])}} \cos[3d] \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3e+6fx+\frac{i}{2}b\log[f]+2\frac{i}{2}cx\log[f])}{2\sqrt{3f+\frac{i}{2}c\log[f]}}\right] \\
& \log[f]^3 \sqrt{3f+\frac{i}{2}c\log[f]} + 27 (-1)^{1/4} e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right] \sqrt{f-\frac{i}{2}c\log[f]} \sin[d] + \\
& 27 (-1)^{3/4} c e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right] \\
& \log[f] \sqrt{f-\frac{i}{2}c\log[f]} \sin[d] + 3 (-1)^{1/4} c^2 e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right] \log[f]^2 \sqrt{f-\frac{i}{2}c\log[f]} \sin[d] + \\
& 3 (-1)^{3/4} c^3 e^{\frac{i(-e^2+2ib\log[f]+b^2\log[f]^2)}{4(f-i\log[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (e+2fx-\frac{i}{2}b\log[f]-2\frac{i}{2}cx\log[f])}{2\sqrt{f-\frac{i}{2}c\log[f]}}\right]
\end{aligned}$$

$$\begin{aligned}
& \text{Log}[f]^3 \sqrt{f - \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + 27 (-1)^{3/4} e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f + i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + \\
& 27 (-1)^{1/4} c e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f + i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f] \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{3/4} c^2 e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f + i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \text{Log}[f]^2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + \\
& 3 (-1)^{1/4} c^3 e^{-\frac{i(-e^2 - 2 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(f + i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{3/4} (e + 2 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f]^3 \sqrt{f + \frac{i}{2} c \operatorname{Log}[f]} \sin[d] + 3 (-1)^{1/4} e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{3/4} c e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f] \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{1/4} c^2 e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \text{Log}[f]^2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{3/4} c^3 e^{-\frac{i(-9 e^2 + 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f - i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{1/4} (3 e + 6 f x - \frac{i}{2} b \operatorname{Log}[f] - 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f]^3 \sqrt{3 f - \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} f^3 \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} f^2 \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f] \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + 3 (-1)^{3/4} c^2 e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} f \\
& \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \text{Log}[f]^2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] + \\
& (-1)^{1/4} c^3 e^{-\frac{i(-9 e^2 - 6 i b e \operatorname{Log}[f] + b^2 \operatorname{Log}[f]^2)}{4(3 f + i c \operatorname{Log}[f])}} \operatorname{Erfi}\left[\frac{(-1)^{3/4} (3 e + 6 f x + \frac{i}{2} b \operatorname{Log}[f] + 2 \frac{i}{2} c x \operatorname{Log}[f])}{2 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]}}\right] \\
& \text{Log}[f]^3 \sqrt{3 f + \frac{i}{2} c \operatorname{Log}[f]} \sin[3 d] \Bigg) \Bigg)
\end{aligned}$$

/16 /f - i r I n o r f 1) /2 f - i r I n o r f 1) /f + i r I n o r f 1) /2 f + i r I n o r f 1))

Problem 141: Result more than twice size of optimal antiderivative.

$$\int \frac{F^c(a+b x)}{f + f \cos(d + e x)} dx$$

Optimal (type 5, 79 leaves, 2 steps):

$$\left(2 e^{i(d+e x)} F^c(a+b x) \operatorname{Hypergeometric2F1}\left[2, 1 - \frac{i b c \operatorname{Log}[F]}{e}, 2 - \frac{i b c \operatorname{Log}[F]}{e}, -e^{i(d+e x)}\right] \right) / \\ (f(i e + b c \operatorname{Log}[F]))$$

Result (type 5, 248 leaves):

$$\frac{1}{e f (1 + \cos(d + e x)) (e - i b c \operatorname{Log}[F])} \\ 2 F^{-\frac{b c d}{e}} \cos\left(\frac{1}{2} (d + e x)\right) \left(b c e^{\frac{(d+e x)(i e + b c \operatorname{Log}[F])}{e}} F^a c \cos\left(\frac{1}{2} (d + e x)\right) \right. \\ \left. \operatorname{Hypergeometric2F1}\left[1, 1 - \frac{i b c \operatorname{Log}[F]}{e}, 2 - \frac{i b c \operatorname{Log}[F]}{e}, -e^{i(d+e x)}\right] \operatorname{Log}[F] - \right. \\ \left. i F^c\left(a+b\left(\frac{d}{e}+x\right)\right) \cos\left(\frac{1}{2} (d + e x)\right) \operatorname{Hypergeometric2F1}\left[1, -\frac{i b c \operatorname{Log}[F]}{e}, 1 - \frac{i b c \operatorname{Log}[F]}{e}, \right. \right. \\ \left. \left. -e^{i(d+e x)}\right] (e - i b c \operatorname{Log}[F]) + F^c\left(a+b\left(\frac{d}{e}+x\right)\right) (e - i b c \operatorname{Log}[F]) \sin\left(\frac{1}{2} (d + e x)\right) \right)$$

Problem 142: Result more than twice size of optimal antiderivative.

$$\int \frac{F^c(a+b x)}{(f + f \cos(d + e x))^2} dx$$

Optimal (type 5, 169 leaves, 3 steps):

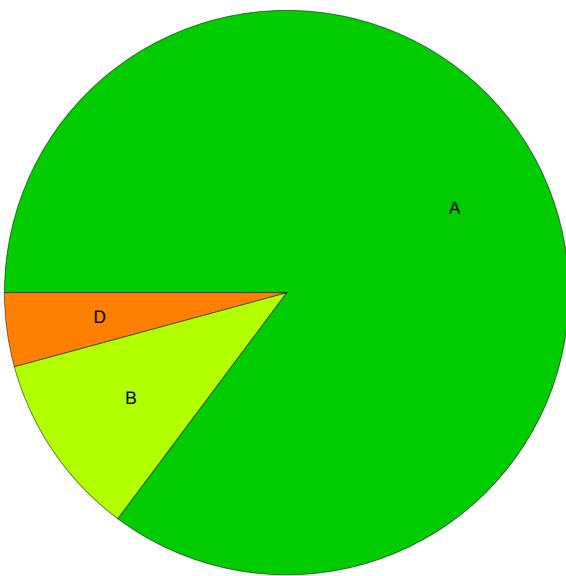
$$-\frac{1}{3 e^2 f^2} 2 e^{i(d+e x)} F^c(a+b x) \\ \operatorname{Hypergeometric2F1}\left[2, 1 - \frac{i b c \operatorname{Log}[F]}{e}, 2 - \frac{i b c \operatorname{Log}[F]}{e}, -e^{i(d+e x)}\right] (i e - b c \operatorname{Log}[F]) - \\ \frac{b c F^c(a+b x) \operatorname{Log}[F] \sec\left[\frac{d}{2} + \frac{e x}{2}\right]^2}{6 e^2 f^2} + \frac{F^c(a+b x) \sec\left[\frac{d}{2} + \frac{e x}{2}\right]^2 \tan\left[\frac{d}{2} + \frac{e x}{2}\right]}{6 e f^2}$$

Result (type 5, 749 leaves):

$$\begin{aligned}
& - \frac{2 b c F^{\frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}} \cos \left[\frac{d}{2} + \frac{e x}{2}\right]^2 \log [F]}{3 e^2 (f + f \cos [d + e x])^2} + \\
& \frac{1}{3 e^4 (f + f \cos [d + e x])^2} 8 i b c F^{\frac{c (-b d+a e)}{e}} \cos \left[\frac{d}{2} + \frac{e x}{2}\right]^4 \log [F] (-i e + b c \log [F]) \\
& \left(\frac{1}{2 b c \log [F]} \right) \left(\begin{array}{l} \text{Hypergeometric2F1}[1, \right. \\
& \left. \left(\frac{d}{2} + \frac{e x}{2} \right), \frac{a c - b c d - \frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}}{2 b c \log [F]} \right) \right. \\
& - \frac{i b c \log [F]}{e}, 1 - \frac{i b c \log [F]}{e}, -e^{2 i \left(\frac{d}{2} + \frac{e x}{2}\right)} \left. \right] - \left(\begin{array}{l} \left(\frac{d}{2} + \frac{e x}{2} \right) \left(2 i + \frac{\left(a c - b c d - \frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}\right) \log [F]}{\frac{d}{2} + \frac{e x}{2}} \right) \\ 1 - \frac{i \left(a c - b c d - \frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}\right) \log [F]}{2 \left(\frac{d}{2} + \frac{e x}{2}\right)} + \frac{1}{2} i \left(2 i + \frac{\left(a c - b c d - \frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}\right) \log [F]}{\frac{d}{2} + \frac{e x}{2}} \right) \right) \text{Hypergeometric2F1}[\right. \\
& \left. \left(e^{2 i \left(\frac{d}{2} + \frac{e x}{2}\right)} \right) \right) \left(\begin{array}{l} 1, \frac{e - i b c \log [F]}{e}, 1 + \frac{e - i b c \log [F]}{e}, -e^{2 i \left(\frac{d}{2} + \frac{e x}{2}\right)} \end{array} \right) \right) \Bigg) \Bigg) / \left(2 (e - i b c \log [F]) \right) + \\
& \frac{2 F^{\frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}} \cos \left[\frac{d}{2} + \frac{e x}{2}\right] \sin \left[\frac{d}{2} + \frac{e x}{2}\right]}{3 e (f + f \cos [d + e x])^2} + \left(4 F^{\frac{c (-b d+a e)}{e} + \frac{2 b c \left(\frac{d}{2} + \frac{e x}{2}\right)}{e}} \cos \left[\frac{d}{2} + \frac{e x}{2}\right]^3 \right. \\
& \left. (e^2 + b^2 c^2 \log [F]^2) \sin \left[\frac{d}{2} + \frac{e x}{2}\right] \right) / \left(3 e^3 (f + f \cos [d + e x])^2 \right)
\end{aligned}$$

Summary of Integration Test Results

142 integration problems



A - 121 optimal antiderivatives

B - 15 more than twice size of optimal antiderivatives

C - 0 unnecessarily complex antiderivatives

D - 6 unable to integrate problems

E - 0 integration timeouts