

Find each derivative.

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|---|--------------------------------|
| 1 | $f(x) = e^{x^3}$ |
| 2 | $y = \ln(\csc 3x)$ |
| 3 | $f(x) = \ln(x^2 + 3 - e^{5x})$ |
| 4 | $f(x) = \sec^3(2x)$ |
| 5 | $y = \ln(x \sin x)$ |
| 6 | $y = 2^{\cos x}$ |
| 7 | $y = x^2 e^x$ |
| 8 | $y = \sqrt{x^2 + 4x + 2}$ |

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| 9 | $\lim_{h \rightarrow 0} \frac{\cot(x+h) - \cot x}{h}$ |
| 10 | What is the slope of the line tangent to the graph of $y = e^{\sin x} + x$ when $x = \pi$? |
| 11 | Approximate $\sqrt[3]{7.6}$ using linearization. |
| 12 | For $f(x) = x^2 + 2x + 8$, approximate $f(2.9)$. |
| 13 | Evaluate $\lim_{x \rightarrow 3} \frac{\tan(x-3)}{3e^{x-3} - x}$ |

Answers:

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|--|--------------------------------------|--|---|
| 1) $f'(x) = 3x^2 e^{x^3}$ | 2) $y' = -3 \cot 3x$ | 3) $f'(x) = \frac{2x - 5e^{5x}}{x^2 + 3 - e^{5x}}$ | 4) $f'(x) = 6 \sec^3 2x \tan 2x$ |
| 5) $y' = \frac{x \cos x + \sin x}{x \sin x}$ | 6) $y' = -2^{\cos x} (\ln 2) \sin x$ | 7) $y' = x e^x (x + 2)$ | 8) $y' = \frac{x + 2}{\sqrt{x^2 + 4x + 2}}$ |
| 9) $-\csc^2 x$ | 10) 0 | 11) $\frac{59}{30}$ | 12) $f(2.9) \approx 22.2$ |
| 13) $\frac{1}{2}$ | | | |