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If $g(x)$ is the inverse of $f(x) = x^3 + x - 3$, find $g'(7)$.

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If $g(x)$ is the inverse of $f(x) = 2x^3 + 3x - 1$, find $g'(4)$.

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Prove that $\frac{d}{dx}\cos x = -\sin x$ from the definition of the derivative. You may use the two **limits** proved in class without reproving them.

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If $f(x) = \cos x$, find $f^{(75)}(x)$. You must explain why your answer is correct.

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If $f(x) = \sin x$, find $f^{(69)}(x)$. You must explain why your answer is correct.

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Find the derivatives of the following functions. **SIMPLIFY YOUR ANSWERS.**

[a] $f(x) = \ln(\cot x)$

[b] $f(x) = \sec^3 x^5$

[c] $f(x) = 5^{\tan 4x}$

[d] $f(x) = x^2 e^{-5x} \ln x$

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