

Find each limit. Show steps with correct notation (incorrect notation = no credit, ask if you are unsure).

1. $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 3x}$	2. $\lim_{x \rightarrow 5\pi/6} \frac{\sin(x) + 1}{\cos(x)}$	3. $\lim_{x \rightarrow -1} \frac{x}{x^2 - 1}$
4. $\lim_{\theta \rightarrow \pi} \frac{\tan \theta}{\cos \theta + 2}$	5. $\lim_{x \rightarrow 1} \frac{\frac{1}{x} - 1}{x - 1}$	

Find the derivative of each function using the limit definition of the derivative. Show steps with correct notation. (incorrect notation or no steps = no credit) Recall: $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

6. $f(x) = 3x^2 + 4x + 5$	7. $f(x) = \sqrt{x}$
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Find the derivative using the derivative rules. Show steps when appropriate, but there are many problems where no steps are required.

8. $y = x^2 + 4$	9. $f(x) = \sin(x)$	10. $g(\theta) = 5 \tan \theta$	11. $y = x^{5/3} + 3\sqrt{x}$
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12. $y = x^3 \cos(x)$	13. $f(x) = (x^2 + 3x)^7$	14. $g(x) = \cot(5x^3)$
15. $f(x) = \frac{x^4 + 3x^2}{5x + 1}$		16. $y = x^4 \sqrt{5x - 1}$
17. $g(x) = \left(\frac{3x + 5}{4x - 7}\right)^4$	18. $f(t) = \cos^4(3x)$	

Multiple Choice:

19.	<p>The equation of the line tangent to the graph of $f(x) = x(1 - 2x)^3$ at $(1, -1)$ is</p> <p>(A) $y = -7x + 6$ (B) $y = -6x + 5$ (C) $y = -2x + 1$</p> <p>(D) $y = 2x - 3$ (E) $y = 7x - 8$</p>
20.	<p>If $f(x) = \frac{x-1}{x+1}$ for all $x \neq -1$, then $f'(1) =$</p> <p>(A) -1 (B) $-\frac{1}{2}$ (C) 0 (D) $\frac{1}{2}$ (E) 1</p>