

Chapter 3 Practice Test – Calculus

1. Use the definition of the derivative to calculate $f'(x)$ if $f(x) = \frac{3}{x}$.
2. Show that $f(x) = 2/x$ is not differentiable at $x = 0$.
3. For the test, given the graph of a function, be able to sketch its derivative, and vice versa, given the sketch of a derivative, be able to sketch its function. (See notes and assignments for examples of this.)
4. Find the instantaneous rate of change of $y = \sin x$ with respect to x at $x = 0$.
5. If $y = x^4 + \sqrt[3]{x^5}$, $dy/dx =$
6. Find dy/dx if $y = 3e^{20} + \pi$.
7. Find $f'(x)$ if $f(x) = (x^2 + 5x)(3x^2 - 1)$.
8. If $y = \frac{3x+5}{2x}$, then $\left. \frac{dy}{dx} \right|_{x=1} =$
9. If $h(x) = \left(\frac{2}{x}\right)g(x)$, find $h'(2)$, given that $g(2) = 3$, and $g'(2) = -1$.
10. If $y = \cos(7x)$, then $\frac{d^2y}{dx^2} =$
11. If $y = \sqrt{\cot x + 5x}$, then $dy/dx =$
12. If $y = \sin^2(\pi x)$ find dy/dx .
13. If $y = 3\ln(x5^{2x})$, the find dy/dx .
14. If $y = 8^x$, find $d^n y/dx^n$.
15. If $y = \ln^2(\tan(x))$, then $dy/dx =$
16. Find $\frac{d((4x)(\cos^{-1}3x))}{dx}$.
17. Find dy/dx if $x^4 + y^4 = 10$
18. Use logarithmic differentiation to find $\frac{dy}{dx}$, where $y = (4x)^{x+9}$.
19. Be able to describe *why* the definition of the derivative works. That is, using the ideas of secant lines and tangent lines, explain why does either $f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h)-f(a)}{h}$ or $f'(a) = \lim_{x \rightarrow a} \frac{f(x)-f(a)}{x-a}$ make sense.