

2.10 Tangents, Normals, and Continuity (Revisited)

- 491.** Find the equation of the tangent line to the curve $y = \sqrt{x^2 - 3}$ at the point $(2, 1)$.
- 492.** Find the equation of the normal line to the curve $y = (3x - 1)^2(x - 1)^3$ at $x = 0$.
- 493.** Find the equation of the tangent line to the curve $y = \sqrt{3x - 1}$ that is perpendicular to the line $3y + 2x = 3$.
- 494.** Find the equation of the normal line to the curve $y = x\sqrt{25 + x^2}$ at $x = 0$.
- 495.** Find the equation of the tangent line to the curve $y = \frac{2 - x}{5 + x}$ at $x = 1$.
- 496.** Find the equation of the normal line to the curve $y = \frac{5}{(5 - 2x)^2}$ at $x = 0$.
- 497.** Find the equation of the tangent line to the curve $y = 3x^4 - 2x + 1$ that is parallel to the line $y - 10x - 3 = 0$.
- 498.** The point $P(3, -2)$ is not on the graph of $y = x^2 - 7$. Find the equation of each line tangent to $y = x^2 - 7$ that passes through P .

FOR THE FOLLOWING SIX PROBLEMS, DETERMINE IF f IS DIFFERENTIABLE AT $x = a$.

499. $f(x) = |x + 5|$; $a = -5$

502. $f(x) = \begin{cases} -2x^2 & x < 0 \\ 2x^2 & x \geq 0 \end{cases}$ $a = 0$

500. $f(x) = \begin{cases} x + 3 & x \leq -2 \\ -x - 1 & x > -2 \end{cases}$ $a = -2$

503. $f(x) = \begin{cases} x^2 - 5 & x < 3 \\ 3x - 5 & x \geq 3 \end{cases}$ $a = 3$

501. $f(x) = \begin{cases} 2 & x < 0 \\ x - 4 & x \geq 0 \end{cases}$ $a = 0$

504. $f(x) = \begin{cases} \sqrt{2 - x} & x < 2 \\ (2 - x)^2 & x \geq 2 \end{cases}$ $a = 2$

- 505.** Suppose that functions f and g and their first derivatives have the following values at $x = -1$ and at $x = 0$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
-1	0	-1	2	1
0	-1	-3	-2	4

Evaluate the first derivatives of the following combinations of f and g at the given value of x .

a) $3f(x) - g(x)$, $x = -1$

d) $f(g(x))$, $x = -1$

b) $[f(x)]^3[g(x)]^3$, $x = 0$

e) $\frac{f(x)}{g(x) + 2}$, $x = 0$

c) $g(f(x))$, $x = -1$

f) $g(x + f(x))$, $x = 0$