

**In Exercises 5–10, find the slope of the tangent line to the graph of the function at the specified point.**

5.  $f(x) = 3 - 2x$ ,  $(-1, 5)$

6.  $g(x) = \frac{3}{2}x + 1$ ,  $(-2, -2)$

7.  $g(x) = x^2 - 4$ ,  $(1, -3)$

8.  $g(x) = 5 - x^2$ ,  $(2, 1)$

9.  $f(t) = 3t - t^2$ ,  $(0, 0)$

10.  $h(t) = t^2 + 3$ ,  $(-2, 7)$

**In Exercises 11–24, find the derivative by the limit process.**

11.  $f(x) = 3$

12.  $g(x) = -5$

13.  $f(x) = -5x$

14.  $f(x) = 3x + 2$

15.  $h(s) = 3 + \frac{2}{3}s$

16.  $f(x) = 9 - \frac{1}{2}x$

17.  $f(x) = 2x^2 + x - 1$

18.  $f(x) = 1 - x^2$

19.  $f(x) = x^3 - 12x$

20.  $f(x) = x^3 + x^2$

21.  $f(x) = \frac{1}{x-1}$

22.  $f(x) = \frac{1}{x^2}$

23.  $f(x) = \sqrt{x+1}$

24.  $f(x) = \frac{4}{\sqrt{x}}$

**In Exercises 25–32, (a) find an equation of the tangent line to the graph of  $f$  at the indicated point, (b) use a graphing utility to graph the function and its tangent line at the point, and (c) use the *derivative* feature of a graphing utility to confirm your results.**

25.  $f(x) = x^2 + 1$ ,  $(2, 5)$

26.  $f(x) = x^2 + 2x + 1$ ,  $(-3, 4)$

27.  $f(x) = x^3$ ,  $(2, 8)$

28.  $f(x) = x^3 + 1$ ,  $(1, 2)$

29.  $f(x) = \sqrt{x}$ ,  $(1, 1)$

30.  $f(x) = \sqrt{x-1}$ ,  $(5, 2)$

31.  $f(x) = x + \frac{4}{x}$ ,  $(4, 5)$

32.  $f(x) = \frac{1}{x+1}$ ,  $(0, 1)$

**In Exercises 33–36, find an equation of the line that is tangent to the graph of  $f$  and parallel to the given line.**

<u>Function</u>	<u>Line</u>
33. $f(x) = x^3$	$3x - y + 1 = 0$
34. $f(x) = x^3 + 2$	$3x - y - 4 = 0$
35. $f(x) = \frac{1}{\sqrt{x}}$	$x + 2y - 6 = 0$
36. $f(x) = \frac{1}{\sqrt{x-1}}$	$x + 2y + 7 = 0$

**In Exercises 61–70, use the alternative form of the derivative to find the derivative at  $x = c$  (if it exists).**

61.  $f(x) = x^2 - 1$ ,  $c = 2$

62.  $g(x) = x(x - 1)$ ,  $c = 1$

63.  $f(x) = x^3 + 2x^2 + 1$ ,  $c = -2$

64.  $f(x) = x^3 + 2x$ ,  $c = 1$

65.  $g(x) = \sqrt{|x|}$ ,  $c = 0$

66.  $f(x) = 1/x$ ,  $c = 3$

67.  $f(x) = (x - 6)^{2/3}$ ,  $c = 6$

68.  $g(x) = (x + 3)^{1/3}$ ,  $c = -3$

69.  $h(x) = |x + 5|$ ,  $c = -5$

70.  $f(x) = |x - 4|$ ,  $c = 4$

**In Exercises 81–84, find the derivatives from the left and from the right at  $x = 1$  (if they exist). Is the function differentiable at  $x = 1$ ?**

81.  $f(x) = |x - 1|$

82.  $f(x) = \sqrt{1 - x^2}$

83.  $f(x) = \begin{cases} (x - 1)^3, & x \leq 1 \\ (x - 1)^2, & x > 1 \end{cases}$

84.  $f(x) = \begin{cases} x, & x \leq 1 \\ x^2, & x > 1 \end{cases}$

**In Exercises 85 and 86, determine whether the function is differentiable at  $x = 2$ .**

85.  $f(x) = \begin{cases} x^2 + 1, & x \leq 2 \\ 4x - 3, & x > 2 \end{cases}$

86.  $f(x) = \begin{cases} \frac{1}{2}x + 1, & x < 2 \\ \sqrt{2x}, & x \geq 2 \end{cases}$