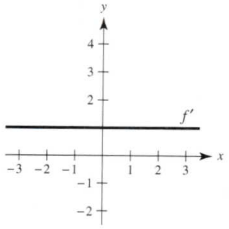
33. $y = 2x - 1$ **35.** $y = 3x - 2; y = 3x + 2$

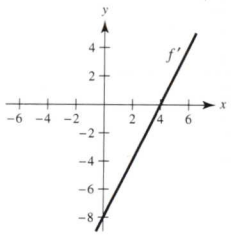
37. $y = -\frac{1}{2}x + \frac{3}{2}$ **39.** b **40.** d **41.** a **42.** c

43. $g(4) = 5; g'(4) = -\frac{5}{3}$

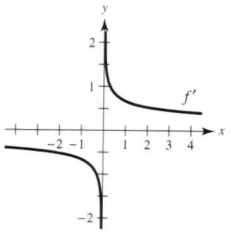
45.



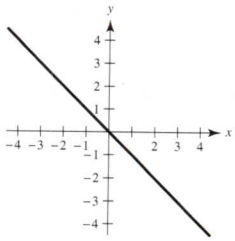
47.



49.



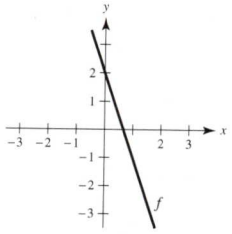
51. Answers will vary.
Sample answer: $y = -x$



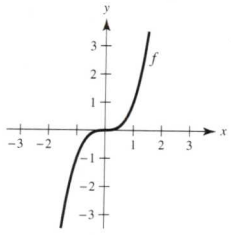
53. $f(x) = 5 - 3x$
$c = 1$

55. $f(x) = -x^2$
$c = 6$

57. $f(x) = -3x + 2$

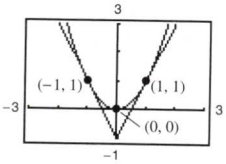


59. Answers will vary.
Sample answer: $f(x) = x^3$



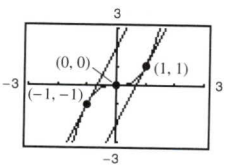
61. $y = 2x + 1; y = -2x + 9$

63. (a)



For this function, the slopes of the tangent lines are always distinct for different values of x.

(b)



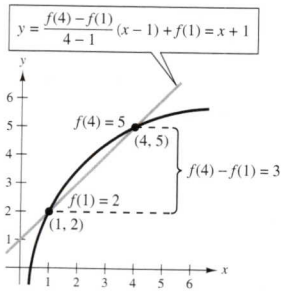
For this function, the slopes of the tangent lines are sometimes the same.

Chapter 2

Section 2.1 (page 103)

1. (a) $m_1 = 0, m_2 = 5/2$ (b) $m_1 = -5/2, m_2 = 2$

3.



5. $m = -5$ **7.** $m = 4$

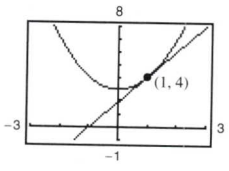
9. $m = 3$ **11.** $f'(x) = 0$ **13.** $f'(x) = -10$ **15.** $h'(s) = \frac{2}{3}$

17. $f'(x) = 2x + 1$ **19.** $f'(x) = 3x^2 - 12$

21. $f'(x) = \dfrac{-1}{(x-1)^2}$ **23.** $f'(x) = \dfrac{1}{2\sqrt{x+4}}$

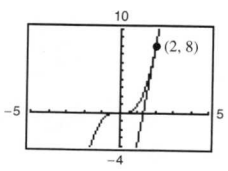
25. (a) Tangent line:
$y = 2x + 2$

(b)



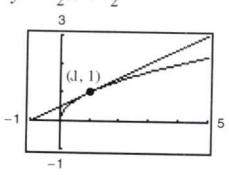
27. (a) Tangent line:
$y = 12x - 16$

(b)



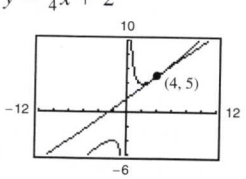
29. (a) Tangent line:
$y = \frac{1}{2}x + \frac{1}{2}$

(b)

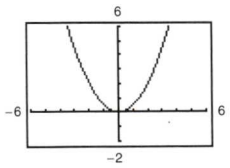


31. (a) Tangent line:
$y = \frac{3}{4}x + 2$

(b)



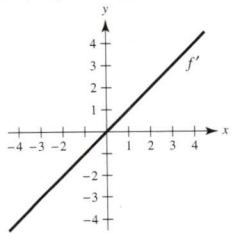
65. (a)



$f'(0) = 0, f'\left(\frac{1}{2}\right) = \frac{1}{2}, f'(1) = 1, f'(2) = 2$

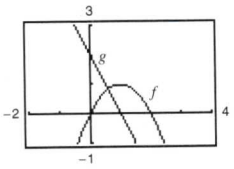
(b) $f'\left(-\frac{1}{2}\right) = -\frac{1}{2}, f'(-1) = -1, f'(-2) = -2$

(c)



(d) $f'(x) = x$

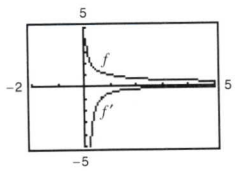
67.



$g(x) \approx f'(x)$

69. $f(2) = 4; f(2.1) = 3.99; f'(2) \approx -0.1$

71.



As x approaches infinity, the graph of f approaches a line of slope 0. Thus $f'(x)$ approaches 0.

73. 6 **75.** 4 **77.** $g(x)$ is not differentiable at $x = 0$.

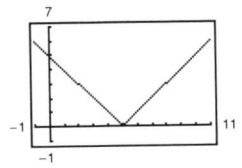
79. $f(x)$ is not differentiable at $x = 6$.

81. $h(x)$ is not differentiable at $x = -7$.

83. $(-\infty, 3) \cup (3, \infty)$ **85.** $(-\infty, -4) \cup (-4, \infty)$

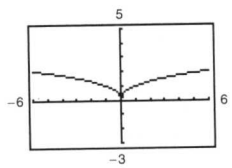
87. $(1, \infty)$

89.



$(-\infty, 5) \cup (5, \infty)$

91.



$(-\infty, 0) \cup (0, \infty)$

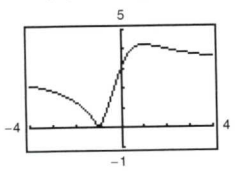
93. The derivative from the left is -1 and the derivative from the right is 1, so f is not differentiable at $x = 1$.

95. The derivatives from both the right and the left are 0, so $f'(1) = 0$.

97. f is differentiable at $x = 2$.

99. (a) $d = \left(3|m + 1|\right)/\sqrt{m^2 + 1}$

(b)



Not differentiable at $m = -1$

101. False. The slope is $\lim_{\Delta x \to 0} \dfrac{f(2 + \Delta x) - f(2)}{\Delta x}$.

103. False. For example: $f(x) = |x|$. The derivative from the left and the derivative from the right both exist but are not equal.

105. Proof