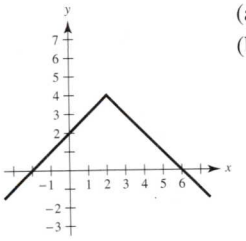
Review Exercises for Chapter 2 (page 158)

1. $f'(x) = 2x - 4$ **3.** $f'(x) = -2/(x-1)^2$

5. f is differentiable at all $x \neq 3$.

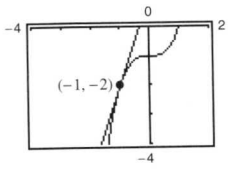
7. 

(a) Yes

(b) No, because the derivatives from the left and right are not equal.

9. $-\frac{3}{2}$

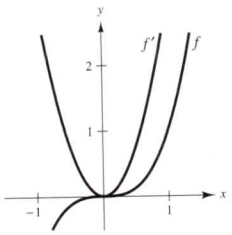
11. (a) $y = 3x + 1$

(b) 

13. 8

15. 0 **17.** $8x^7$ **19.** $52t^3$ **21.** $3x^2 - 22x$ **23.** $\frac{3}{\sqrt{x}} + \frac{1}{\sqrt[3]{x^2}}$

25. $-4/(3t^3)$ **27.** $4 - 5\cos\theta$ **29.** $-3\sin\theta - (\cos\theta)/4$

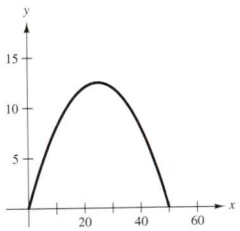
31. 

$f' > 0$ where the slopes of tangent lines to the graph of f are positive.

33. (a) 50 vibrations/sec/lb

(b) 33.33 vibrations/sec/lb

35. 1354.24 ft or 412.77 m

37. (a) 

(b) 50

(c) $x = 25$

(d) $y' = 1 - 0.04x$

x	0	10	25	30	50
y'	1	0.6	0	−0.2	−1

(e) $y'(25) = 0$

39. (a) $x'(t) = 2t - 3$ (b) $(-\infty, 1.5)$ (c) $x = -\frac{1}{4}$ (d) 1

41. $4(5x^3 - 15x^2 - 11x - 8)$ **43.** $\sqrt{x}\cos x + \sin x/(2\sqrt{x})$

45. $-(x^2+1)/(x^2-1)^2$ **47.** $(8x)/(9-4x^2)^2$

49. $\dfrac{4x^3\cos x + x^4\sin x}{\cos^2 x}$ **51.** $3x^2\sec x\tan x + 6x\sec x$

53. $-x\sin x$ **55.** $y = 4x - 3$ **57.** $y = 0$

59. $v(4) = 20$ m/sec; $a(4) = -8$ m/sec^2

61. $-48t$ **63.** $\frac{225}{4}\sqrt{x}$ **65.** $6\sec^2\theta\tan\theta$

67. $y'' + y = -(2\sin x + 3\cos x) + (2\sin x + 3\cos x) = 0$

69. $\dfrac{2(x+5)(-x^2-10x+3)}{(x^2+3)^3}$

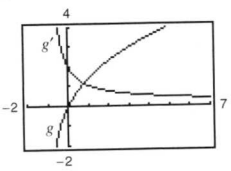
71. $s(s^2-1)^{3/2}(8s^3 - 3s + 25)$

73. $-45\sin(9x+1)$ **75.** $\frac{1}{2}(1-\cos 2x) = \sin^2 x$

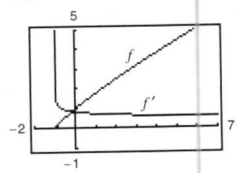
77. $\sin^{1/2}x\cos x - \sin^{5/2}x\cos x = \cos^3 x\sqrt{\sin x}$

79. $\dfrac{(x+2)(\pi\cos\pi x) - \sin\pi x}{(x+2)^2}$ **81.** -2 **83.** 0

85. $(x+2)/(x+1)^{3/2}$ **87.** $5/[6(t+1)^{1/6}]$

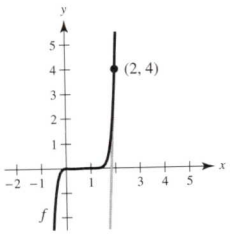


g' is not equal to zero for any x.



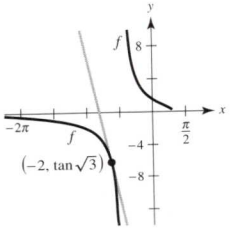
f' has no zeros.

89. (a) $f'(2) = 24$ (b) $y = 24t - 44$

(c) 

91. (a) $f'(-2) = -\dfrac{1}{2\sqrt{3}\cos^2\sqrt{3}} \approx -11.1983$

(b) $y = -\dfrac{\sqrt{3}(x+2)}{6\cos^2\sqrt{3}} + \tan\sqrt{3}$

(c) 

93. $14 - 4\cos 2x$ **95.** $2\csc^2 x \cot x$

97. $[8(2t + 1)]/(1 - t)^4$

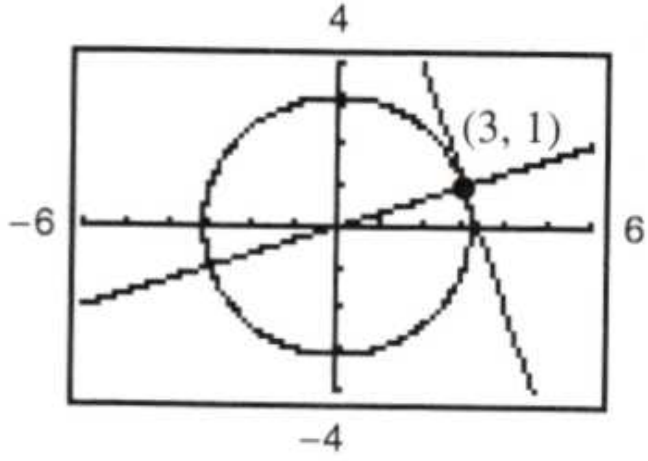
99. $18\sec^2 3\theta \tan 3\theta + \sin(\theta - 1)$

101. (a) $-18.667°/\text{h}$ (b) $-7.284°/\text{h}$
(c) $-3.240°/\text{h}$ (d) $-0.747°/\text{h}$

103. $-\dfrac{2x + 3y}{3(x + y^2)}$ **105.** $\dfrac{\sqrt{y}\left(2\sqrt{x} - \sqrt{y}\right)}{\sqrt{x}\left(\sqrt{x} + 8\sqrt{y}\right)} = \dfrac{2x - 9y}{9x - 32y}$

107. $\dfrac{y\sin x + \sin y}{\cos x - x\cos y}$

109. Tangent line: $3x + y - 10 = 0$
Normal line: $x - 3y = 0$



111. (a) $2\sqrt{2}$ units/sec (b) 4 units/sec (c) 8 units/sec

113. $\frac{2}{25}$ m/min **115.** -38.34 m/sec