Section 2.2

32. $-\infty$,

Section 2.3

2. (a) 1 (b) does not exist (c) 2 (d) does not exist (e) -4 (f) 3

22. $\dfrac{2}{3}$

Section 2.5

36. 0

Section 2.6

24. 2 **40.** $-\frac{\pi}{2}$

Section 2.7

37. $f(x) = \sqrt{x}$, $a = 9$, and limit is $f'(9) = \dfrac{1}{6}$ **41.** $f(x) = \cos x$, $a = \pi$, and limit is $f'(\pi) = 0$

42. $f(\theta) = \sin\theta$, $a = \dfrac{\pi}{6}$, and limit is $f'\left(\dfrac{\pi}{6}\right) = \dfrac{\sqrt{3}}{2}$

Section 2.8

42. $f(x)$ in not differentiable at $x = -1$ (discontinuous) and at $x = 2$ (a corner).

Chapter 2 Review:

12. $-\dfrac{5}{54}$ **14.** $-\dfrac{1}{2}$

Section 3.1

58. A tangent line is $y = 32x - 47$.

Section 3.2

54. Two tangent lines: $y = \frac{1}{2}\,x - \frac{1}{2}$ (at the point $(1, 0)$) and $y = \frac{1}{2}\,x + \frac{7}{2}$ (at the point $(-3, 2)$)

Section 3.3

30. $f'(t) = \sec t \tan t$, $f''(t) = \sec t \tan^2 t + \sec^3 t$, and $f''(\pi/4) = 3\sqrt{2}$.

Section 3.4

12. $-2\sin\theta\cos\theta$ or $-\sin(2\theta)$ **22.** $5\left(x + \dfrac{1}{x}\right)^4\left(1 - \dfrac{1}{x^2}\right)$ **30.** $2n\tan(n\theta)\sec^2(n\theta)$

40. $2\cos(2x)\,e^{\sin(2x)} + 2e^{2x}\cos\left(e^{2x}\right)$

Section 3.5

50. $y' = \dfrac{2x}{1 + x^4}$ **52.** $g'(x) = \dfrac{-1}{2\sqrt{x}\sqrt{1-x}}$

Chapter 3 Review

2. $y' = -\frac{1}{2}\frac{1}{\sqrt{x^3}} + \frac{3}{5}\frac{1}{\sqrt[5]{x^8}}$ **84a.** The tangent line is $y = \frac{1}{4}x + \frac{1}{4}(\ln 4 + 1)$.

108. $\lim_{\theta \to \pi/3} \frac{\cos\theta - 0.5}{\theta - \pi/3} = \left[\frac{d}{d\theta}\cos\theta\right]_{\theta=\pi/3} = -\sin\frac{\pi}{3} = -\frac{\sqrt{3}}{2}$

Section 4.3

8. (a) Increasing on $[0, 4) \cup (6, 8)$ and decreasing on $(4, 6) \cup (8, 9]$

(b) Local maximum at $x = 4$ and $x = 8$ and local minimum at $x = 6$.

(c) Concave up on $(0, 1) \cup (2, 3) \cup (5, 7)$ and concave down on $(1, 2) \cup (3, 5) \cup (7, 9)$.

(d) Points of inflections are at $x = 1, 2, 3, 5, 7$.

52a. HA: $y = -1$ and $y = 0$ and VA: $x = 0$ **56a.** Since HA: $y = e^{\pi/2}$ and $y = e^{-\pi/2}$. No VA.

Section 4.4

22. 0

Section 4.7

8. The dimensions of rectangle with minimal perimeter are $x = y = 10\sqrt{10}\,m$ and it is a square.

16. The minimum cost is $C\left(\sqrt[3]{\frac{9}{2}}\right) = 20\left(\sqrt[3]{\frac{9}{2}}\right)^2 + \frac{180}{\sqrt[3]{\frac{9}{2}}} \approx \$163.54$ **22.** $\left(\frac{5}{2}, \sqrt{\frac{5}{2}}\right)$

Section 4.9

16. $R(\theta) = \sec\theta - 2e^\theta + C$ **34.** $f(t) = \frac{1}{2}t^2 - \frac{1}{2t^2} + 6$

Chapter 4 Review

8. $\frac{4}{3}$ **10.** ∞ **66.** $G(x) = \ln|x| + \tan^{-1}x + C$

Section 5.2

34. **(a)** 4, **(b)** -2π, **(c)** $\frac{9}{2} - 2\pi$

Section 5.3

46. $\frac{1}{4}$

Section 5.4

12. $\frac{x^3}{3} + x + \tan^{-1}x + C$ **16.** $\tan t + \sec t + C$ **30.** π **32.** $1 - \ln 4$ **36.** $\sqrt{2} - 1$

Chapter 5 Review

38. $\frac{15}{4}$