Answers for Even-Numbered Problems
Unit 3

4.2

2. $c = \dfrac{1+\sqrt{19}}{3} \approx 1.786$

10. $c = \pm \dfrac{2}{\sqrt{3}}$

12. $c = \sqrt{3}$

14. $c = -\ln\left(\dfrac{1-e^{-2}}{2}\right) \approx 0.839$

16. See solution manual for the solution for the first part of this problem. Second question: This does not contradict the MVT since *f* is not differentiable at $x = 1/2$.

4.3

2a. $(0, 1) \cup (3, 5) \cup (5, 7)$

2b. $(1, 3)$

2c. $(2, 4) \cup (5, 7)$

2d. $(0, 2) \cup (4, 5)$

2e. $(2, 2), (4, 3), (5, 4)$

6a. Inc: $(0, 1) \cup (3, 5)$; Dec: $(1, 3) \cup (5, 6)$

6b. Rel. Max: $x = 1,\ x = 5$; Rel. Min: $x = 3$

8a. Inc: $(2, 4) \cup (6, 9)$

8b. Rel. Max: $x = 4$; Rel. Min: $x = 2,\ x = 6$

8c. Con. Up: $(1, 3) \cup (5, 7) \cup (8, 9)$; Con. Down: $(0, 1) \cup (3, 5) \cup (7, 8)$

8d. $x = 1, 3, 5, 7, 8$

12a. Inc: $(-1, 1)$; Dec: $(-\infty, -1) \cup (1, \infty)$

12b. Rel. Max: $(1, 1/2)$; Rel. Min: $(-1, -1/2)$

12c. Con. Up: $(-\sqrt{3}, 0) \cup (\sqrt{3}, \infty)$; Con. Down: $(-\infty, -\sqrt{3}) \cup (0, \sqrt{3})$; POI: $(-\sqrt{3}, -\sqrt{3}/4)$, $(0, 0)$, $(\sqrt{3}, \sqrt{3}/4)$

14a. Inc: $\left(\dfrac{\pi}{2}, \dfrac{3\pi}{2}\right)$; Dec: $\left(0, \dfrac{\pi}{2}\right) \cup \left(\dfrac{3\pi}{2}, 2\pi\right)$

14b. Rel. Max: $\left(\dfrac{3\pi}{2}, 2\right)$; Rel. Min: $\left(\dfrac{\pi}{2}, -2\right)$

14c. Con. Up: $\left(\dfrac{\pi}{6}, \dfrac{5\pi}{6}\right)$; Con. Down: $\left(0, \dfrac{\pi}{6}\right) \cup \left(\dfrac{5\pi}{6}, \dfrac{3\pi}{2}\right) \cup \left(\dfrac{3\pi}{2}, 2\pi\right)$; POI: $\left(\dfrac{\pi}{6}, -\dfrac{1}{4}\right)$, $\left(\dfrac{5\pi}{6}, -\dfrac{1}{4}\right)$

16a. Inc: $\left(e^{-1/2}, \infty\right)$; Dec: $\left(0, e^{-1/2}\right)$

16b. Rel. Min: $\left(e^{-1/2}, \dfrac{1}{2e}\right)$

16c. Con. Up: $\left(e^{-3/2}, \infty\right)$; Con. Down: $\left(0, e^{-3/2}\right)$; POI: $\left(e^{-3/2}, -\dfrac{3}{2e^3}\right)$

22a. $x = 0,\ 4/7,\ 1$

22b. Since $f''(0) = f''(1) = 0$, the Second Derivative Test is inconclusive for $x = 0, 1$. Since $f''(4/7) = \frac{576}{2401} > 0$, f has a relative minimum at $x = 4/7$.

22c. The First Derivative Test indicates that there is a relative maximum at $x = 0$, and a relative minimum at $x = 4/7$.

40a. Inc: $(0, 1)$; Dec: $(-\infty, 0) \cup (1, \infty)$

40b. Rel. Max: $(1, 3)$; Rel. Min: $(0, 0)$

40c. Con. Up: $(-\infty, -1/2)$; Con. Down: $(-1/2, 0) \cup (0, \infty)$; POI: $\left(-\frac{1}{2}, \frac{6}{\sqrt[3]{4}}\right)$

40d. Check with graphing calculator or check solution manual.

46a. HA: $y = 1$

46b. Inc: $(0, \infty)$; Dec: $(-\infty, 0)$

46c. Rel. Min: $(0, -1)$

46d. Con. Up: $\left(-\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}\right)$; Con. Down: $\left(-\infty, -\frac{2}{\sqrt{3}}\right) \cup \left(\frac{2}{\sqrt{3}}, \infty\right)$; POI: $\left(\pm\frac{2}{\sqrt{3}}, -\frac{1}{2}\right)$

46e. Check with graphing calculator or check solution manual.

48a. HA: $y = -1$, $y = 0$; VA: $x = 0$

48b. Inc: $(-\infty, 0) \cup (0, \infty)$

48c. No relative extreme values

48d. Con. Up: $(-\infty, 0)$; Con. Down: $(0, \infty)$; POI: none

48e. Check with graphing calculator or check solution manual.

4.4

2a. Indeterminate: $0 \cdot \infty$

2b. ∞

2c. ∞

10. $11/20$

30. 0

32. $\frac{n^2 - m^2}{2}$

38. 2

42. 0

44. 0

50. 0

52. 0

56. 1

58. e^{ab}

72. 0