Answers to Even-Numbered Exercises

Exercises 0.2

4. $f(0) = 0$, $f(2) = \frac{2}{3}$,

10. $[-1, 1]$

16. $(-\infty, \infty)$

20. $[0, \infty)$

28. It is the graph of a function since it passes the vertical line test.

34. It passes the horizontal line tests and so it is the graph of a one-to-one function.

44. $g(x) = (1/x) + 2$, $x \neq 0$. Its domain consists of all $x \neq 0$, and its range consists of all $y \neq 2$.

Exercises 0.3

6. It is decreasing on $(-2, -1)$ and $(0, 1)$, and increasing on $(-1, 0)$ and $(1, 2)$.

14. It is increasing on $(-\infty, 0)$, and it is decreasing on $(0, \infty)$.

18. f is neither even nor odd.

22. f is even and its graph is symmetric about the y-axis.

28. y-intercept is 3. There is no x-intercept.

36. (i) it matches (b).
(ii) it matches (c).
(iii) matches (a).

40. Translate the graph of $y = x^2$ to the left by 2 units and downward by 1 unit.

Exercises 0.4

6. slope -3, y-intercept 7

20. $x = -2$ (vertical)

22. $y = -\frac{1}{2}x + 4$

26. (a) $C(x) = 450x + 2100$
. $R(x) = 1050x$
. $P(x) = 600x - 2100$
(b) $x = 3.5$
(c) P(9) = \$3300
(d) 5

34. supply curve is $q = 160p - 120$, $p \geq 0.75$
demand curve is $q = -150p + 600$
equilibrium point is $q_e = 7800/31 \approx 251.61$

Exercises 0.5

2. Graph opens upward, vertex is (1,4), axis of symmetry is $x = 1$.

8. Graph opens upward, vertex is $(-\frac{1}{3}, \frac{2}{3})$, axis of symmetry is $x = -\frac{1}{3}$.

10. $f(x) = 2x^2 - x - 1 = (2x + 1)(x - 1)$.
$f(x)$ will be positive on $(-\infty, -1/2)$ and $(1, \infty)$, and negative on $(-1/2, 1)$.

16. $f(x) = x^2 - \frac{3}{4} = (x + \frac{\sqrt{3}}{2})(x - \frac{\sqrt{3}}{2})$.
$f(x) > 0$ on $(-\infty, -\frac{\sqrt{3}}{2})$ and $(\frac{\sqrt{3}}{2}, \infty)$; $f(x) < 0$ on $(-\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2})$.

22. (a) $p = 60 - q/20$, $R(q) = 60q - \frac{q^2}{20}$, $P(x) = -\frac{q^2}{20} + 44q - 3000$.
(b) break-even points: $q = 440 \pm 20\sqrt{334} \approx 74.5$ or 805.5.
(c) $C(p) = 22200 - 320p$
$R(p) = 1200p - 20p^2$
$P(p) = -20p^2 + 1520p - 22200$
break-even points are $p = 38 \pm \sqrt{334} \approx 19.72$ and 56.28
(d) A profit will be made if the price is between \$19.72 and \$56.28.

26. (a) $t = \frac{3+\sqrt{23}}{2} \approx 3.9$
(b) $t = 3/2$
(c) 92

Exercises 0.6

2. $f(x)$ falls to the left and right

8. $a_n < 0$, n is even

10. $f(x)$ has vertical asymptote $x = 1$
As x approaches 1, $f(x)$ climbs from the right, and falls from the left.

20. $f(x)$ has vertical asymptotes $x = 0$ and $x = 4$
As x approaches 0, $f(x)$ climbs from the left, and falls from the right.
As x approaches 4, $f(x)$ climbs from the right, and falls from the left.

26. 0.2

30. 2

36. $f(9) = 27$

42. Natural domain is $(0, \infty)$.
Decreasing on $(0, \infty)$ (i.e. everywhere).
Positive on $(0, \infty)$.
Vertical asymptote $x = 0$, climbs from the right.