Section 1.1

2. a) negative b) negative
   c) positive d) positive
8. a) $b > 0$ b) $s \geq 0$
   c) $w \leq -4$ d) $\dfrac{1}{5} < c < \dfrac{1}{3}$
   e) $p \leq -2$ f) $-m \leq -2$
   g) $\dfrac{r}{s} \geq \dfrac{1}{5}$ h) $\dfrac{1}{f} \geq 14$
   i) $|x| < 4$
12. a) 4 b) $\dfrac{5}{2}$ c) 10

Section 1.2

4. $\dfrac{1}{2}$ 6. $\dfrac{5}{1}$ 12. $-12x^2$

20. $\dfrac{-2x^6 z^5}{y}$ 24. $-4x^{12}y^7$

8. $\dfrac{243}{1}$ 36. $4r^{\frac{5}{6}}$

54. a) $4 + x\sqrt{x}$ b) $(4 + x)\sqrt{4 + x}$
58. -5

64. $\dfrac{4a^4}{b}$

78. $5x^2 y^5 \sqrt{2}$
86. $a^2 + 2a + 1$ $a^2 + 1$

Section 1.3

6. $6x^2 + 19x - 36$
12. $7x^4 - 11x^3 + 4x^2 + 42x - 24$
18. $2a^2 b - 3a + b^2$
22. $25x^2 - 16y^2$
38. $x^3 + 9x^2 y + 27xy^2 + 27y^3$
46. $4u^2 - 2uv = 2u(2u - v)$
62. $(3x + 4)^2$
68. $(9r + 4t)(9r - 4t)$
72. $x(x + 5)(x - 5)$
76. $4(4x + 3y)(4x - 3y)$
86. $5(x + 2)^2(x - 2)$
92. $(x^4 + 4)(x^2 + 2)(x^2 - 2)$
100. $x(2x + 1)^2$

Section 1.4

4. $\dfrac{23}{216}$

10. $\dfrac{5 - r}{r^3}$

22. $\dfrac{5t - 6}{t - 3}$

26. $\dfrac{5x + 4}{2x + 3}$

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

46. $\dfrac{-1}{x(x + h)}$

50. $\dfrac{t - 8\sqrt{t} + 16}{t - 16}$

Section 2.1

6. $y = -\dfrac{11}{3}$

12. $x = \dfrac{51}{5}$

22. $x = \dfrac{3}{17}$

30. All Reals, $x \neq -\dfrac{2}{5}$

40. All Reals, $x \neq \pm\dfrac{5}{2}$

44. No Solutions, $(x \neq -4)$

66. $r = \dfrac{A - P}{Pt}$

70. $h = \dfrac{S - 2lw}{2(w + l)}$

Section 2.2

4. $57.42
6. 13 hr.
8. Sell $10 million in bonds and borrow $40 million.
12. Use $\dfrac{40}{3}$ ml of 1% solution and $\dfrac{5}{3}$ ml of 10% solution
14. Use 40 ml of elixir and 60 ml of syrup.
18. After 1:21 PM
24. $h = 13$ ft.
30. about 3 hours

Section 2.3

2. $x = -2, \dfrac{7}{4}$

14. $x = -\dfrac{1}{3}, (x \neq -2)$

16. a) No
    b) Yes

20. $x = \pm\dfrac{7}{4}$

26. a) $d = \dfrac{169}{4}$ b) $d = 9$
    c) $d = \pm10$ d) $d = \pm9$

28. $x = 4 \pm\sqrt{5}$

36. $x = -\dfrac{5}{6} \pm\dfrac{1}{6}\sqrt{13}$

48. $d = \sqrt{\dfrac{gmM}{F}}$, since $d > 0$

50. $t = \dfrac{-v_o + \sqrt{v_o^2 + 2gs}}{g}$

54. 8 in. by 16 in.
56. a. 206.25 ft. b. $v = 40$ mi/hr

Sections 2.4

4. $-5 + 5i$
18. -1

22. $-\dfrac{3}{2} - \dfrac{5}{2}i$

42. $-4 \pm i$

Section 2.5

4. $x = \dfrac{1}{5}$, or $x = -1$

24. $x = 9$ ($x = 2$ is extraneous)

38. $y = \pm \dfrac{1}{6}\sqrt{30 \pm 6\sqrt{13}}$

52. a) $x = -243$ b) $x = \pm125$
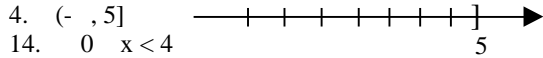   c) No real solutions   d) $x = 9$
    e) No real solutions

56. $t = \dfrac{TA^2}{k^2}$

62. Change in diameter 1.37 ft.

64. $r = \sqrt{3}$ in.

Section 2.6

2. a) $11 > 2$ b) $9 > 0$

   c) $\dfrac{2}{3} > -\dfrac{5}{6}$ d) $-\dfrac{2}{3} < \dfrac{5}{6}$

4. $(-\infty, 5]$

14. $0 \le x < 4$

22. $(-\infty, 1]$

54. $(-\infty, 2.6)$ $(3.4, \infty)$

78. $\dfrac{20}{9} \le x \le 4$

Section 2.7

2. $\dfrac{2}{3}, \dfrac{7}{4}$ 10. $-1, \dfrac{4}{3}$

44. $8 \le t \le 12$

Section 3.1

2. It forms a star

6. A(0, 4), B(-4, 0), C(0, -4),
   D(4, 0), E(2, 2), F(-2, -2)

10. a) $\sqrt{157}$ b) $1, \dfrac{1}{2}$

14. a) $\sqrt{241}$ b) $-2, -\dfrac{1}{2}$

22. Show that $d(A, C) = d(B, C) = 5\sqrt{5}$

Section 3.2

4. x-int.: (-1.5, 0), y-int.: (0, -3)

12. x-int.:(-4, 0), y-int.:(0, $\pm\sqrt{2}$)

32. It is the upper half of the
   circle $x^2 + y^2 = 4$ with center (0, 0) and r = 2

36. $(x + 4)^2 + (y - 1)^2 = 9$

46. $(x + 1)^2 + (y - 4)^2 = 20$

50. C(5, 0), r = $\sqrt{7}$

66. Find the distance between the two stations
   using the Pythagorean theorem and compare
   that to the sum of their signal strengths.

Section 3.3

2. $m = \dfrac{1}{5}$

14. All four lines travel through the origin. Those
   lines with positive slopes go up to the right
   lines with negative slopes to up to
   the left.

20. a. $y = 2$
    b. $x = -4$

22. $2x - 3y = -14$

30. $2x - 3y = -7$

34. $y = \dfrac{6}{5}x + \dfrac{17}{5}$

36. $3x - 4y = -21$

56. a. $P = -125t + 8250$
    b. $t = 26$ months
    c. The endpoints of the graph are
      (0, 8250) and (66, 0)

60. The year 1910

64. a. $F = -40$ b. $C = 160$ and $F = 320$

Section 3.4

6. a. $-4a + 3$ b. $4a + 3$
   c. $4a - 3$ d. $-4a - 4h + 3$
   e. $-4a - 4h + 6$ f. -4

14. a. $\dfrac{-5a + 2}{a}$ b. $\dfrac{1}{2a - 5}$
   c. $2\sqrt{a} - 5$ d. $\sqrt{2a - 5}$

22. $(-\infty, -5]$ $[5, \infty)$

26. $\dfrac{3}{4}, 2$ $(2, \infty)$

34. a.

   b. $D = (-\infty, \infty), R = [-1, \infty)$
   c. Decreasing on $(-\infty, 0]$
     Increasing on $[0, \infty)$

42. $f(x) = -\dfrac{3}{2}x + 4$

56. a. $y = \dfrac{4}{x}$ b. $S = 3x + 4 + \dfrac{12}{x}$

62. a. $y = \sqrt{225 - x^2}$ b.
   $0 < x < 15$

Section 3.5

2. Even   4. Odd   8. Neither

12. Given: $g(x) = |x|$ and $f(x) = |x - c|$
   To find f(x):
     For c = -3, shift g(x) left 3 units
     For c = 1, shift g(x) right 1 unit
     For c = 3, shift g(x) right 3 units

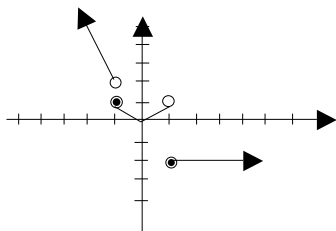14. Given: $g(x) = 2x^2$ and $f(x) = 2x^2 - c$
   to find f(x):
     For c = -4, shift g(x) up 4 units
     For c = 2, shift g(x) down 2 units
     For c = 4, shift g(x) down 4 units

28. Given f(x) as drawn:
   a. shift f right 2 units
   b. shift f left 2 units
   c. shift f down 2 units
   d. shift f up 2 units
   e. reflect f through the x-axis and vertically stretch it by a factor of 2.
   f. reflect f through the x-axis and vertically compress it by a factor of 2.
   g. reflect f through the y-axis and horizontally compress it by a factor of 2.
   h. horizontally stretch f by a factor of 2.
   i. reflect f about the x-axis, shift it left 4 units and down 2 units.
   j. shift f right 4 units and up 2.

36.

50. a. $D = [-6, -2]$, $R = [-5, -2]$
    b. $D = [-3, -1]$, $R = [-10, -4]$
    c. $D = [-4, 0]$, $R = [-5, 1]$
    d. $D = [-10, -6]$, $R = [-11, -5]$
    e. $D = [2, 6]$, $R = [-10, -4]$
    f. $D = [-6, -2]$, $R = [4, 10]$

Section 3.6
10. $f(x) = -4(x - 2)^2 + 3$
16. a. $x = -\dfrac{8}{3}, \dfrac{3}{2}$
    b. -26.04 is a minimum
24. $y = -(x - 2)^2 + 4$
26. $y = \dfrac{5}{9}(x + 1)^2 - 2$
30. $y = \dfrac{7}{64}(x - 4)^2 - 7$

Section 3.7
2. a. -4   b. -14
   c. -45   d. $-\dfrac{9}{5}$
10. a. $3x^2 - 6x + 3$ b. $3x^2 - 1$
    c. $27x^4$ d. $x - 2$
18. a. $27x^3 + 18x^2$ b. $3x^3 + 6x^2$
    c. -144   d. 135

Section 3.8
4. f is not one-to-one
20. $f^{-1}(x) = \dfrac{-3x + 1}{x}$
36. a. The graphs intersect on the line $y = x$
    b. $D = [1, 10]$, $R = [0, 9]$
    c. $D_1 = [0, 9]$, $R_1 = [1, 10]$

Section 3.9
8. $k = \dfrac{2500}{3}$
12. $k = \dfrac{8}{5}$
16. a. $I = \dfrac{k}{d^2}$ b. $k = 2.5 \times 10^9$
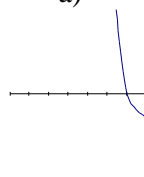   c. 89.7 candlepower
24. a. $V = k\dfrac{nT}{P} = \dfrac{knT}{P}$ b. V is doubled.
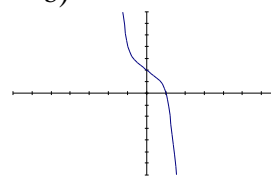78. a. $V = 6000t + 89000$ b. $t = \dfrac{7}{3}$
90. 375 calls

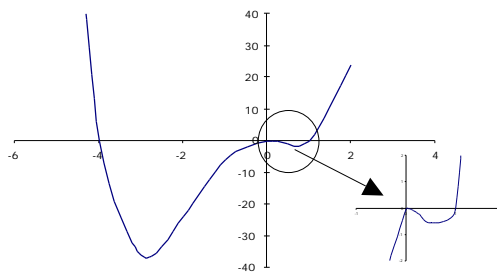**Section 4.1**
2. a)   b)

18. $f(x) > 0$ if $x < -4$ or $x > 1$
    $f(x) < 0$ if $-4 < x < 0$ or $0 < x < 1$

Section 9.1
2. (-2, 5), (1,2)
4. No real solutions, $y = -1 \pm i\sqrt{2}$
18. No real solutions, $x = -\dfrac{6}{5} \pm \dfrac{2}{5}i$
20. $\dfrac{1}{3}, 6$, $(-2, -1)$

Section 9.2
2. (-3, 5)
10. $\dfrac{55}{31}, -\dfrac{95}{31}$
14. No solution, $0 = 31$
28. He can row 55 ft./min.
    The current is 5 ft./min.
36. 320 $0.50 notebooks and 180 $0.75 ones
38. $V_0 = 80$ ft/sec, $S_0 = 20$ ft.

Section 5.1

2.   x = 2

30. $4535.15

Section 5.2

2.   a. f is increasing, y-int = 1, and does not cross
     the x-axis

    b. f is increasing and y-int = 2, does not cross
     the x-axis

8. $10,257.92

Section 5.3

4.   a. 81   b. $\dfrac{1}{256}$

    c. w

    d. 2x - 1   e.   p   f.   343

16.   a. 7   b.   -6   c.   5

    d. -3   e.   8   f. $\dfrac{2}{3}$

    g. 5e

18. $-\dfrac{3}{2}$

26. $\dfrac{1}{8}$

34.   f is increasing, x-int = 1, and does not cross the
    y-axis.

38. $f(x) = -\log_2 x$

40. $f(x) = \log_2(x + 3)$

42. $f(x) = \log_2(1 - x)$

Section 5.4

4. $5\log_a y + 2\log_a w - 4\log_a x - 3\log_a z$

6. $\dfrac{1}{2}\log y - 4\log x - \dfrac{1}{3}\log z$

10.   a. $\log_4(3xz)$ b. $\log_4 \dfrac{x}{7y}$

    c. $\log_4 \sqrt[3]{w}$

14. $\log y^4$

18. $x = \dfrac{13}{3}$

22. $x = \dfrac{2}{15}$

44.   f is decreasing, x-int =1 and does not cross the
    y-axis

Section 5.5

2.   x   0.79

12.   x   -6.34

18.   x   1.54

48. $t = \dfrac{\ln \dfrac{A}{P}}{n \ln\left(1 + \dfrac{r}{n}\right)}$

52.   a. 7.21 hr.   b.   3.11 hr.