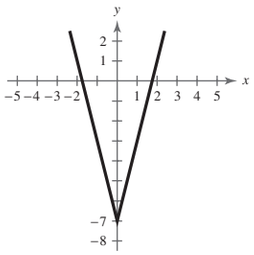
21. (a) $f(x) = |x|$

(b) Reflection in the y-axis (no effect), vertical stretch, and a vertical shift seven units downward

(c)



22. (a) $x^2 - \sqrt{2 - x}$, $(-\infty, 2]$ (b) $\dfrac{x^2}{\sqrt{2 - x}}$, $(-\infty, 2)$

(c) $2 - x$, $(-\infty, 2]$ (d) $\sqrt{2 - x^2}$, $\left[-\sqrt{2}, \sqrt{2}\right]$

23. $f^{-1}(x) = \sqrt[3]{x - 8}$ **24.** No inverse

25. $f^{-1}(x) = \left(\frac{8}{3}x\right)^{2/3}, x \geq 0$

Chapter 2

Section 2.1 (page 172)

Vocabulary Check (page 172)

1. equation **2.** solve

3. identities, conditional equations **4.** $ax + b = 0$

5. extraneous **6.** Mathematical modeling

7. formulas

1. (a) Yes (b) No (c) No (d) No

3. (a) Yes (b) No (c) No (d) No

5. (a) No (b) No (c) No (d) Yes

7. Identity **9.** Identity **11.** Conditional equation

13. $-\frac{96}{23}$ **15.** $\frac{20}{81}$ **17.** 12 **19.** 1 **21.** -9

23. -10 **25.** $-\frac{6}{5}$ **27.** $\frac{17}{48}$ **29.** 10 **31.** 4

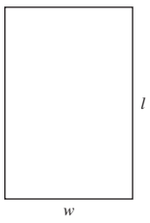
33. 5 **35.** $\frac{11}{6}$ **37.** $\frac{5}{3}$ **39.** No solution

41. $h = \dfrac{2A}{b}$ **43.** $P = A\left(1 + \dfrac{r}{n}\right)^{-nt}$ **45.** $r = \dfrac{S - a}{S - L}$

47. $b = \dfrac{3V}{4\pi a^2}$ **49.** $w = \dfrac{P - 2l}{2}$ **51.** $h = \dfrac{V}{\pi r^2}$

53. $r = \dfrac{S}{2\pi h}$ **55.** $R = \dfrac{PV}{nT}$ **57.** 61.2 inches

59. (a)



(b) $l = 1.5w$; $P = 5w$

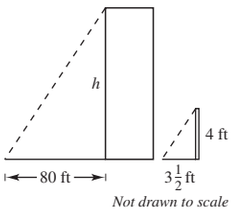
(c) 7.5 meters long × 5 meters wide

61. (a) Test average $= \dfrac{\text{test 1} + \text{test 2} + \text{test 3} + \text{test 4}}{4}$

(b) 97

63. 3 hours **65.** ≈46.3 miles per hour

67. (a)



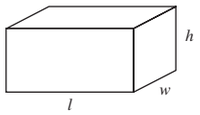
(b) 91.4 feet

69. \$1950 **71.** \$4000

73. \$40,000 in DVD players; \$10,000 in VCRs

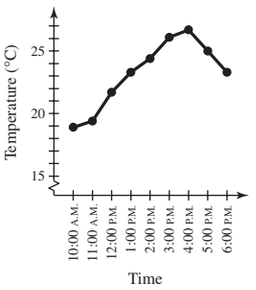
75. 50 pounds of each kind **77.** $h = 27$ feet

79. (a)



(b) $24 \times 12 \times 8$ inches

81.



83. $x = 6$ feet

85. False. It is quadratic; $x(3 - x) = 10 \Rightarrow 3x - x^2 = 10$.

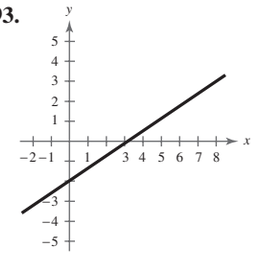
87. $9x + 27 = 0$

89. Equations with the same solution set

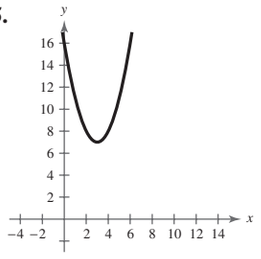
$4x + 16 = 0, 2x + 8 = 0$

91. $\frac{5}{8}$

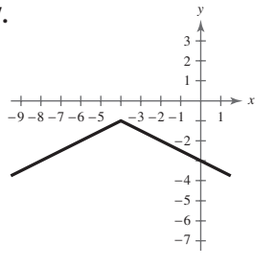
93.



95.



97.



99. −28 **101.** −2580 **103.** −357

Section 2.2 (page 183)

Vocabulary Check (page 183)

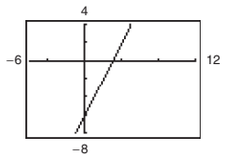
1. *x*-intercept, *y*-intercept **2.** zero

3. point of intersection

1. (5, 0), (0, −5) **3.** (−2, 0), (1, 0), (0, −2)

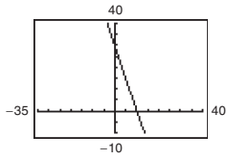
5. (−2, 0), (0, 0) **7.** No intercepts **9.** (1, 0), $\left(0, \frac{1}{2}\right)$

11.



(3, 0), (0, −6)

13.



(10, 0), (0, 30)

15–19. Answers will vary.

21. $\frac{12}{23}$; $f(x) = 2.3x - 1.2 = 0$

23. $\frac{89}{13}$; $f(x) = 13x - 89 = 0$ **25.** 6; $f(x) = 7x - 42 = 0$

27. −194; $f(x) = 0.20x + 38.8 = 0$

29. $\frac{9}{7}$; $f(x) = 9 - 7x = 0$ **31.** 15; $f(x) = 3x - 45 = 0$

33. $-\frac{3}{10}$; $f(x) = 10x + 3 = 0$ **35.** 2.172, 7.828

37. −1.379 **39.** 0.5, −3, 3 **41.** −0.717, 2.107

43. −1.333 **45.** ±3.162 **47.** −1, 7

49. −1, 2.333 **51.** 11 **53.** 21

55. (a)

x	−1	0	1	2	3	4
$3.2x - 5.8$	−9	−5.8	−2.6	0.6	3.8	7

$1 < x < 2$; Answers will vary.

(b)

x	1.5	1.6	1.7	1.8	1.9	2
$3.2x - 5.8$	−1	−0.68	−0.36	−0.04	0.28	0.60

$1.8 < x < 1.9$; Answers will vary. Sample answer: Use smaller intervals of x to increase accuracy.

57. (1, 1) **59.** (2, 2) **61.** (8, −2) **63.** (−1, 3)

65. (4, 1) **67.** (1.45, 1.90), (−3.45, −7.90)

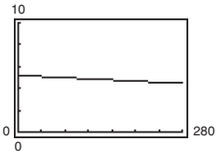
69. (0, 0), (−2, 8), (2, 8)

71. (a) 6.46

(b) $\frac{1.73}{0.27} \approx 6.41$. The second method decreases the accuracy.

73. (a) $t(x) = \frac{x}{63} + \frac{280 - x}{54}$

(b)

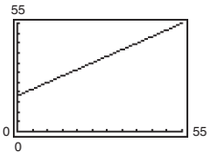


$0 \le x \le 280$

(c) 164.5 miles

75. (a) $A = 0.33(55 - x) + x$

(b)

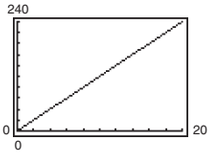


$0 \le x \le 55$

(c) 22.2 gallons

77. (a) $A(x) = 12x$

(b)

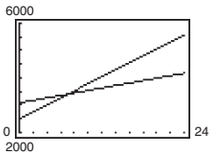


(c) 16.7 units

79. (a) $T = 10{,}000 + \frac{1}{2}x$ (b) $6800

(c) $7600 (d) $7500

81. (a)



(6.7, 3388.7); In 1986, both states had the same population.

(b) (6.7, 3388.7); In 1986, both states had the same population.

(c) Change in population per year; Arizona's population is growing faster.

(d) South Carolina: 4,443,000; Arizona: 6,379,000

Answers will vary.

83. True **85.** False. The lines could be identical.

87. 3 **89.** 1 **91.** $\frac{4\sqrt{3}}{5}$ **93.** $\frac{3(8-\sqrt{11})}{53}$

95. $3x^2 + 13x - 30$ **97.** $4x^2 - 81$

Section 2.3 (page 193)

Vocabulary Check (page 193)

1. (a) ii (b) iii (c) i **2.** $\sqrt{-1}, -1$

3. complex, $a + bi$ **4.** real, imaginary

5. Mandelbrot Set

1. $a = -9, b = 4$ **3.** $a = 6, b = 5$ **5.** $5 + 4i$

7. -6 **9.** $-1 - 5i$ **11.** -75 **13.** $0.3i$

15. $-3 + 3i$ **17.** $7 - 3\sqrt{2}\,i$ **19.** $-14 + 20i$

21. $\frac{19}{6} + \frac{37}{6}i$ **23.** $-4.2 + 7.5i$ **25.** $-2\sqrt{3}$

27. -10 **29.** $5 + i$ **31.** $-20 + 32i$ **33.** 24

35. $80i$ **37.** $4 - 3i$; 25 **39.** $-6 + \sqrt{5}\,i$; 41

41. $-\sqrt{20}\,i$; 20 **43.** $3 + \sqrt{-2}$; 11

45. $-6i$ **47.** $\frac{8}{41} + \frac{10}{41}i$ **49.** $\frac{3}{5} + \frac{4}{5}i$

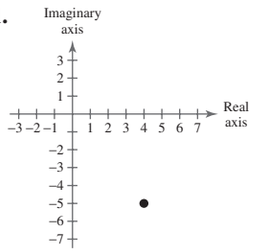
51. $-\frac{40}{1681} - \frac{9}{1681}i$ **53.** $-\frac{1}{2} - \frac{5}{2}i$ **55.** $\frac{62}{949} + \frac{297}{949}i$

57. $-1 + 6i$ **59.** $-375\sqrt{3}\,i$ **61.** i

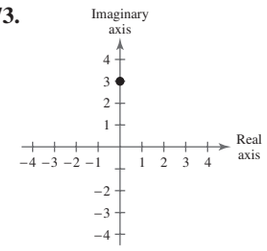
63. (a) 8 (b) 8 (c) 8; Answers will vary.

65. $4 + 3i$ **67.** $5i$ **69.** 2

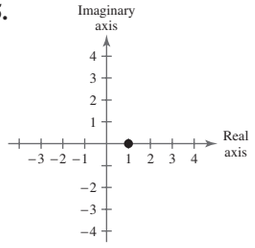
71.



73.



75.



77. $0.5i, -0.25 + 0.5i, -0.1875 + 0.25i, -0.0273 + 0.4063i, -0.1643 + 0.4778i, -0.2013 + 0.3430i$; Yes, bounded

79. $3.12 - 0.97i$

81. False. Any real number is equal to its conjugate.

83. False. Example: $(1 + i) + (1 - i) = 2$, which is not an imaginary number.

85. True **87.** $16x^2 - 25$ **89.** $3x^2 + \frac{23}{2}x - 2$

Section 2.4 (page 205)

Vocabulary Check (page 205)

1. quadratic equation

2. factoring, extracting square roots, completing the square, Quadratic Formula

3. discriminant

4. position, $-16t^2 + v_0t + s_0$, initial velocity, initial height

1. $2x^2 + 5x - 3 = 0$ **3.** $3x^2 - 60x - 10 = 0$

5. $0, -\frac{1}{2}$ **7.** $4, -2$ **9.** $3, -\frac{1}{2}$ **11.** $2, -6$

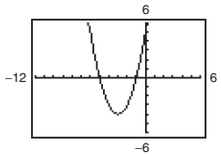
13. $-a - b, -a + b$ **15.** ± 7 **17.** 16, 8

19. $\frac{1 \pm \sqrt{6}\,i}{3}$; $0.33 \pm 0.82i$ **21.** 2 **23.** $-8, 4$

25. $-3 \pm \sqrt{7}$ **27.** $1 \pm \frac{\sqrt{6}}{3}$ **29.** $1 \pm \sqrt{5}\,i$

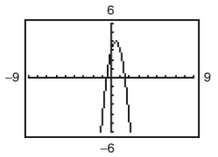
31. $-\frac{5}{4} \pm \frac{\sqrt{89}}{4}$

33. (a)



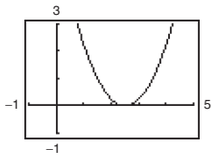
(b) and (c) $(-1, 0), (-5, 0)$

35. (a)



(b) and (c) $(-0.5, 0), (1.5, 0)$

37. (a)



(b) and (c) $(2.5, 0)$

39. No real solutions **41.** One real solution

43. No real solutions **45.** $1 \pm \sqrt{3}$ **47.** $\frac{3}{4} \pm \frac{\sqrt{23}}{4}i$

49. $-\frac{3}{2} \pm \frac{\sqrt{23}}{2}i$ **51.** $-2 \pm \frac{1}{2}i$ **53.** $1 \pm \sqrt{2}$

55. $6, -12$ **57.** $1 \pm \frac{3}{2}i$ **59.** $-\frac{1}{2}$

61. $\frac{-7 \pm \sqrt{73}}{4}$ **63.** $\frac{3}{2}$ **65.** $\frac{5 \pm \sqrt{17}}{4}$

67. $x^2 + x - 30 = 0$; $2x^2 + 2x - 60 = 0$

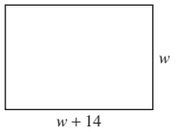
69. $21x^2 + 31x - 42 = 0$; $3x^2 + \frac{31}{7}x - 6 = 0$

71. $x^2 - 75 = 0$; $\frac{x^2}{5} - 15 = 0$

73. $x^2 - 2x - 11 = 0$; $5x^2 - 10x - 55 = 0$

75. $x^2 - 4x + 5 = 0$; $-x^2 + 4x - 5 = 0$

77. (a)



(b) $1632 = w^2 + 14w$

(c) Width: 34 feet; length: 48 feet

79. 14 centimeters × 14 centimeters

81. (a) $s = -16t^2 + 1815$

(b)

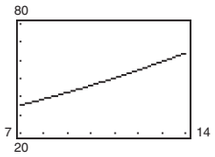
t	0	2	4	6	8	10	12
s	1815	1751	1559	1239	791	215	−489

(c) (10, 12); 10.65 seconds

83. (a) ≈ 22.36 seconds (b) ≈ 3.73 miles

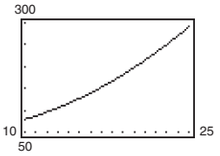
85. (a) 1998 and 2000 (b) Answers will vary.

(c)



(d) 2006 (e) Answers will vary.

87. (a)



(b) 16.8°C (c) 2.5

89. Eastbound plane: ≈550 miles per hour
Northbound plane: ≈600 miles per hour

91. False. Both solutions are complex.

93. False. Imaginary solutions are always complex conjugates of each other.

95. (a) and (b) $x = -5, -\frac{10}{3}$ (c) Answers will vary.

97. Proof **99.** Answers will vary. **101.** e

103. $x^2(x - 3)(x^2 + 3x + 9)$

105. $(x + 5)(x - \sqrt{2})(x + \sqrt{2})$ **107.** Function

109. Not a function **111.** Function

113. Answers will vary.

Section 2.5 (page 216)

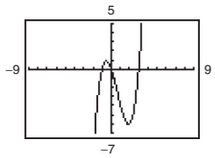
Vocabulary Check (page 216)

1. n **2.** extraneous **3.** quadratic

1. $0, \pm 2$ **3.** $-3, 0$ **5.** $3, \pm 1$ **7.** $\pm 1, \pm \sqrt{3}$

9. $\pm\frac{1}{2}, \pm 4$ **11.** $-\frac{1}{5}, -\frac{1}{3}$ **13.** $2, -\frac{3}{5}$

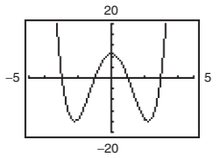
15. (a)



(b) and (c) $(-1, 0), (0, 0), (3, 0)$

(d) They are the same.

17. (a)



(b) and (c) $(-3, 0), (-1, 0), (1, 0), (3, 0)$

(d) They are the same.

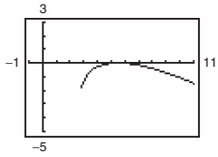
19. $\frac{100}{9}$ **21.** 26 **23.** −16 **25.** −256.5

27. 6, 7 **29.** 0 **31.** 0 **33.** $\frac{1}{4}$ **35.** 9

37. $\frac{11}{2}$ **39.** $1, -\frac{125}{8}$ **41.** $-59, 69$

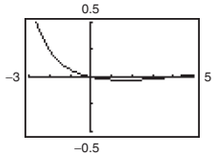
43. $-117, 133$ **45.** 2, 3 **47.** 1

49. (a)



(b) and (c) $x = 5, 6$ (d) They are the same.

51. (a)



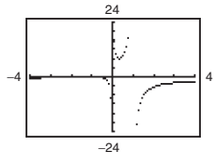
(b) and (c) $x = 0, 4$ (d) They are the same.

CHAPTER 2

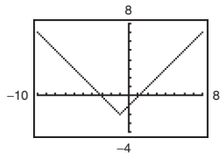
53. $2, -\frac{3}{2}$ **55.** $\frac{-3 \pm \sqrt{21}}{6}$ **57.** $4, -5$

59. $\frac{1 \pm \sqrt{31}}{3}$ **61.** $3, -2$ **63.** $\sqrt{3}, -3$

65. $\frac{-1 - \sqrt{17}}{2}, 3$

67. (a) 

(b) and (c) $x = -1$
(d) They are the same.

69. (a) 

(b) and (c) $x = 1, -3$
(d) They are the same.

71. 34 students **73.** 191.5 miles per hour **75.** $\approx 4\%$

77. (a)

Year	1990	1991	1992	1993	1994
Number of lung transplants	206	455	558	637	703

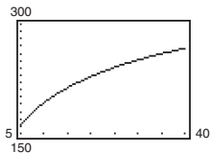
Year	1995	1996	1997	1998	1999
Number of lung transplants	762	815	864	909	952

Year	2000	2001	2002	2003	2004
Number of lung transplants	992	1031	1068	1103	1137

(b) 1991; 2000 (c) and (d) $t \approx 1.4$; $t \approx 10.2$

(e) 2017, 2042; Answers will vary.

79. 26,250 **81.** 249,900

83. (a) 

(b) 211.6°F (c) 24.725 pounds per square inch

85. False. For example, $|x| = x^2 + x + 3$ has two extraneous solutions.

87. $x^3 - 4x^2 - 2x + 8 = 0$

89. $x^4 + \frac{3}{2}x^3 - 6x^2 - \frac{7}{2}x + 3 = 0$

91. $x^4 - 3x^2 - 4 = 0$ **93.** $x = 6, x = -4$

95. $a = b = 9$, or $a = 0, b = 18$ **97.** $a = 4, b = 24$

99. $\frac{25}{6x}$ **101.** $\frac{-3z^2 - 2z + 4}{z(z + 2)}$ **103.** 11

Section 2.6 (page 228)

Vocabulary Check (page 228)

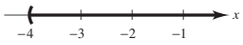
1. negative **2.** double **3.** $-a \le x \le a$

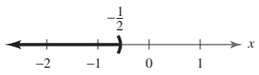
4. $x \le -a,\ x \ge a$ **5.** zeros, undefined values

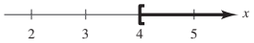
1. f **2.** a **3.** d **4.** b **5.** e **6.** c

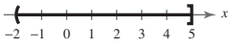
7. (a) Yes (b) No (c) Yes (d) No

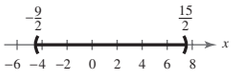
9. (a) No (b) Yes (c) Yes (d) No

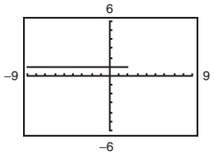
11. $x > -4$


13. $x < -\frac{1}{2}$


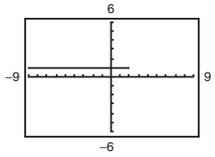
15. $x \ge 4$


17. $-2 < x \le 5$


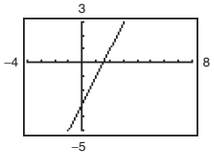
19. $-\frac{9}{2} < x < \frac{15}{2}$


21.


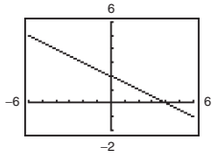
$x \le 2$

23.


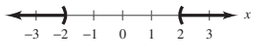
$x < 2$

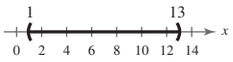
25.


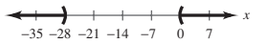
(a) $x \ge 2$
(b) $x \le \frac{3}{2}$

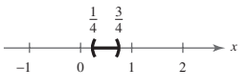
27.


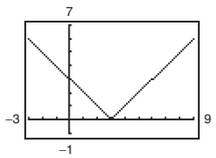
(a) $-2 \le x \le 4$
(b) $x \le 4$

29. $x < -2,\ x > 2$


31. $1 < x < 13$


33. $x < -28,\ x > 0$


35. $\frac{1}{4} < x < \frac{3}{4}$


37. 

(a) $1 \le x \le 5$

(b) $x \le -1, x \ge 7$

39. $|x| \le 3$ **41.** $|x| > 3$ **43.** $|x - 7| \le 10$

45. $|x - 3| \ge 5$

47. Positive on: $(-\infty, -1) \cup (5, \infty)$

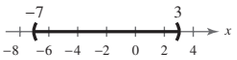
Negative on: $(-1, 5)$

49. Positive on: $\left(-\infty, \dfrac{2 - \sqrt{10}}{2}\right) \cup \left(\dfrac{2 + \sqrt{10}}{2}, \infty\right)$

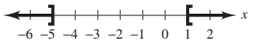
Negative on: $\left(\dfrac{2 - \sqrt{10}}{2}, \dfrac{2 + \sqrt{10}}{2}\right)$

51. Positive on: $(-\infty, \infty)$

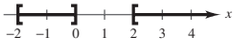
53. $(-7, 3)$



55. $(-\infty, -5], [1, \infty)$

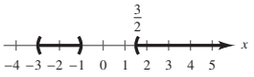


57. $[-2, 0], [2, \infty)$

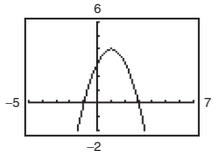


59. No solution

61. $(-3, -1), \left(\frac{3}{2}, \infty\right)$



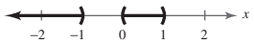
63. (a) $x = 1$ (b) $x \ge 1$ (c) $x > 1$

65. 

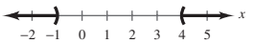
(a) $x \le -1, x \ge 3$

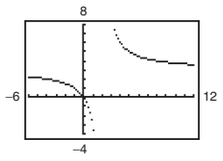
(b) $0 \le x \le 2$

67. $(-\infty, -1), (0, 1)$



69. $(-\infty, -1), (4, \infty)$



71. 

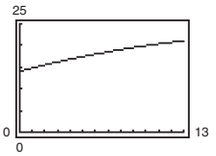
(a) $0 \le x < 2$

(b) $2 < x \le 4$

73. $[5, \infty)$ **75.** $(-\infty, \infty)$ **77.** $(-\infty, -2], [2, \infty)$

79. (a) 1994 (b) (1990, 1994); (1994, 2004)

81. (a) 10 seconds (b) (4, 6)

83. (a) 

(b) (1991, 2000)

(c) $1.28 < t < 10.09$

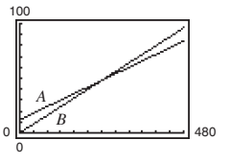
(d) No; Answers will vary.

85. $t \ge 2.11$; Answers will vary.

87. 20.70; Answers will vary.

89. $333\frac{1}{3}$ vibrations per second **91.** $1.2 < t < 2.4$

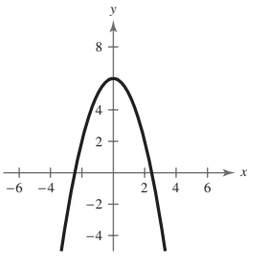
93. (a) $A = 12 + 0.15x$, $B = 0.20x$

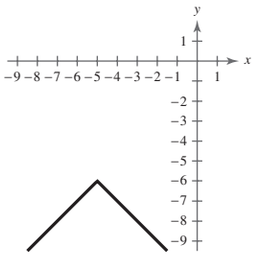
(b) 

(c) Option B is the better option for monthly usage of up to 240 minutes. For more than 240 minutes, option A is the better option.

(d) Sample answer: I would choose option A because I normally use my cell phone more than 240 minutes per month.

95. False. $10 \ge -x$ **97.** a, b **99.** iv, ii, iii, i

101. 

103. 

105. $y^{-1} = \dfrac{x}{12}$ **107.** $y^{-1} = \sqrt[3]{x - 7}$

109. Answers will vary.

Section 2.7 (page 237)

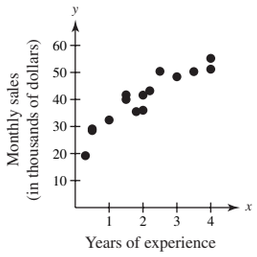
Vocabulary Check (page 237)

1. positive **2.** negative **3.** fitting a line to data

4. $-1, 1$

CHAPTER 2

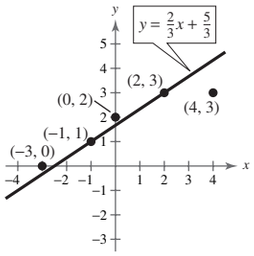
1. (a)



(b) Answers will vary.

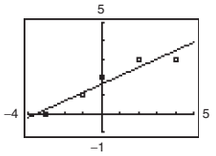
3. Negative correlation **5.** No correlation

7. (a)



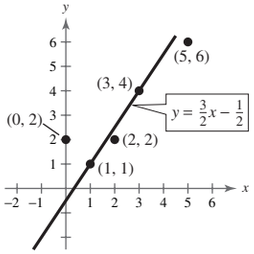
(b) $y = 0.46x + 1.62$; 0.95095

(c)



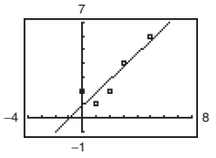
(d) The models appear valid.

9. (a)



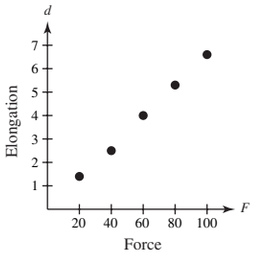
(b) $y = 0.95x + 0.92$; 0.90978

(c)



(d) The models appear valid.

11. (a)

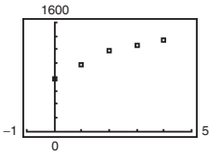


(b) $d = 0.07F - 0.3$

(c) $d = 0.066F$

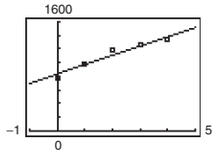
(d) 3.63 centimeters

13. (a)



(b) $S = 136.1t + 836$

(c)

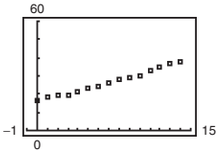


The model fits the data.

(d) 2005: \$1,516,500; 2010: \$2,197,000; Answers will vary.

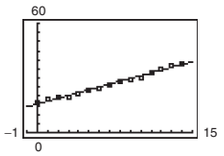
(e) 136.1; The slope represents the average annual increase in salaries (in thousands of dollars).

15. (a)



(b) $C = 1.552t + 15.70$; 0.99544

(c)

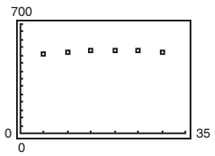


(d) Yes; answers will vary.

(e) 2005: \$38.98; 2010: \$46.74

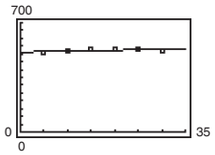
(f) Answers will vary.

17. (a)



(b) $P = 0.6t + 512$

(c)

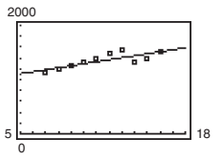


The model is not the best fit for the data.

(d) 542,000 people; answers will vary.

19. (a) $T = 36.7t + 926$; 0.79495

(b)



(c) The slope represents an increase of about 37 Target stores annually.

(d) 2013

(e)

Year	1997	1998	1999	2000	2001
Actual T-values (in thousands)	1130	1182	1243	1307	1381
T-values from model (in thousands)	1183	1220	1256	1293	1330

Year	2002	2003	2004	2005	2006
Actual T-values (in thousands)	1475	1553	1308	1400	1505
T-values from model (in thousands)	1366	1403	1440	1477	1513

Answers will vary.

21. True. To have positive correlation, the y-values tend to increase as x increases.

23. Answers will vary. **25.** (a) 10 (b) $2w^2 + 5w + 7$

27. (a) 5 (b) 1 **29.** $-\frac{3}{5}$ **31.** $-\frac{1}{4}, \frac{3}{2}$

33. $\dfrac{7 \pm \sqrt{17}}{4}$

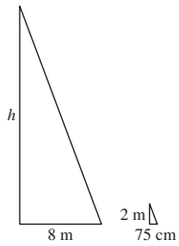
Review Exercises (page 242)

1. (a) No (b) No (c) No (d) Yes **3.** $x = 9$

5. $x = \frac{11}{3}$ **7.** $x = \frac{1}{2}$ **9.** $x = 6$ **11.** $x = \frac{7}{3}$

13. September: \$325,000; October: \$364,000

15. (a)



(b) $h = \frac{64}{3}$ meters

17. $-3.5°C$ **19.** $(-3, 0), (0, 3)$ **21.** $(1, 0), (8, 0), (0, 8)$

23. $x = 2.2$ **25.** $x = -1.301$ **27.** $x = 0.338, 1.307$

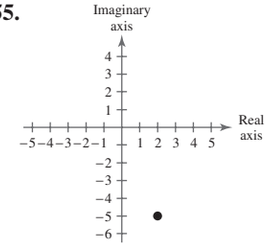
29. $(1, -2)$ **31.** $(4.5, -3.125), (-3, 2.5)$ **33.** $6 + 5i$

35. $2 + 7i$ **37.** $3 + 7i$ **39.** $40 + 65i$

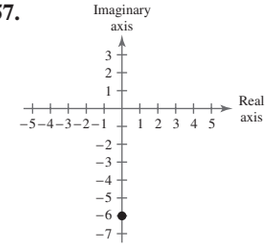
41. $-26 + 7i$ **43.** $3 + 9i$ **45.** $-4 - 46i$

47. -80 **49.** $1 - 6i$ **51.** $\frac{17}{26} + \frac{7}{26}i$ **53.** $-3 - 2i$

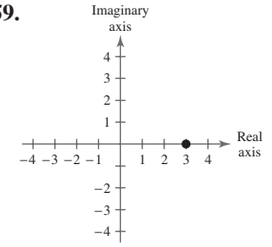
55.



57.



59.



61. $-3, \frac{1}{2}$ **63.** $\frac{2}{3}, 5$ **65.** $0, 2$ **67.** $-1, 5$

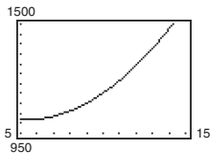
69. $-1, 4$ **71.** $-1, \frac{3}{2}$ **73.** $-\frac{5}{2}, 3$ **75.** $-4 \pm 3\sqrt{2}$

77. $6 \pm \sqrt{6}$ **79.** $\dfrac{1}{2}, -5$ **81.** $\dfrac{-1 \pm \sqrt{61}}{2}$

83. $-2 \pm \sqrt{6}i$ **85.** $\dfrac{3 \pm \sqrt{33}i}{2}$

CHAPTER 2

87. (a)



(b) 2001 (c) $t = 11.47$ or 2001

(d) 2004 and 2008 (e) Answers will vary.

89. $0, \frac{2}{3}, 8$ **91.** $0, \frac{12}{5}$ **93.** $\pm 2, \pm \sqrt{3}i$

95. $\pm 2, \pm \sqrt{7}$ **97.** 5 **99.** $\frac{25}{4}$

101. No solution **103.** $-124, 126$

105. $-2 \pm \frac{\sqrt{95}}{5}, -4$ **107.** $-4, 1$ **109.** $\frac{1}{5}$

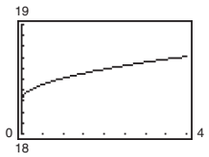
111. 2, 6 **113.** $-5, 15$ **115.** 1, 3

117. Four farmers **119.** 3%

121. (a)

Year	2000	2001	2002	2003	2004
Population (in millions)	18.31	18.51	18.59	18.65	18.71

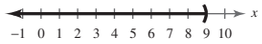
(b)



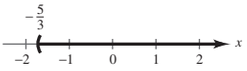
(c) 2000 (d) $t \approx 0.912$

(e) 2012; Answers will vary. (f) Answers will vary.

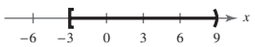
123. $(-\infty, 9)$



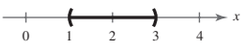
125. $\left(-\frac{5}{3}, \infty\right)$



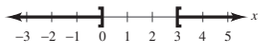
127. $[-3, 9)$



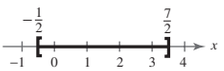
129. $(1, 3)$



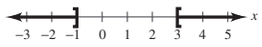
131. $(-\infty, 0], [3, \infty)$



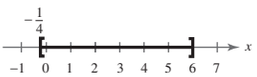
133. $\left[-\frac{1}{2}, \frac{7}{2}\right]$



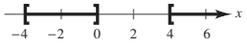
135. $(-\infty, -1], [3, \infty)$



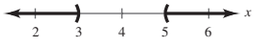
137. $\left[-\frac{1}{4}, 6\right]$



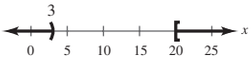
139. $[-4, 0], [4, \infty)$



141. $(-\infty, 3), (5, \infty)$



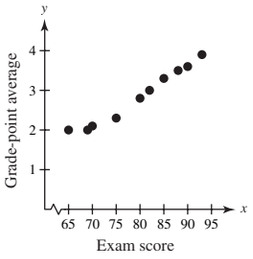
143. $(-\infty, 3), [20, \infty)$



145. $[4, \infty)$

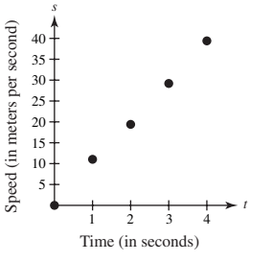
147. $(-\infty, \infty)$ **149.** $\approx \$0.26$

151. (a)



(b) Yes. Answers will vary.

153. (a)



(b) Answers will vary. Sample answer: $S = 10t - 0.4$

(c) $s = 9.70t + 0.4$; This model fits the data better.

(d) 24.7 meters per second

155. False. A graph with two distinct y-intercepts is not a function.

157. False. A regression line can have a positive or negative slope.

159. Answers will vary. **161.** $\sqrt{-6}\sqrt{-6} = 6i^2 = -6$

163. (a) 1 (b) i (c) -1 (d) $-i$

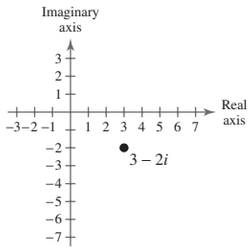
Chapter Test (page 246)

1. $x = 3$ **2.** $x = \frac{2}{15}$ **3.** $-9 - 18i$

4. $6 + \left(2\sqrt{5} + \sqrt{14}\right)i$ **5.** $13 + 4i$ **6.** $-17 + 14i$

7. $\frac{43}{37} + \frac{38}{37}i$ **8.** $1 + 2i$ **9.** $\frac{4}{13} + \frac{7}{13}i$

10.



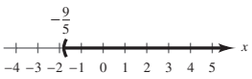
11. ± 1.414

12. ± 0.5 **13.** 0 **14.** $\pm 1, 0$ **15.** 1, 9

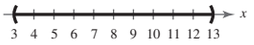
16. $-6 \pm \sqrt{38}$ **17.** $\pm\frac{9}{2}$ **18.** $-3, \frac{1}{5}$ **19.** $\pm 2, \frac{4}{3}$

20. 2 **21.** $\pm\sqrt{58}$ **22.** $-\frac{5}{2}, \frac{11}{4}$

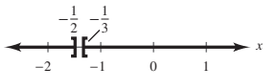
23. $\left(-\frac{9}{5}, \infty\right)$



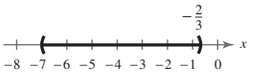
24. (3, 13)



25. $\left(-\infty, -\frac{1}{2}\right], \left[-\frac{1}{3}, \infty\right)$



26. $\left(-7, -\frac{2}{3}\right)$



27. $S = 18.30t - 76.2$; 0.99622; 2005

Cumulative Test for Chapters P–2 (page 247)

1. $\frac{7x^3}{16y^5}, x \neq 0$ **2.** $9\sqrt{15}$ **3.** $2x^2y\sqrt{7y}$

4. $7x - 10$ **5.** $x^3 - x^2 - 5x + 6$ **6.** $\frac{x - 1}{(x + 1)(x + 3)}$

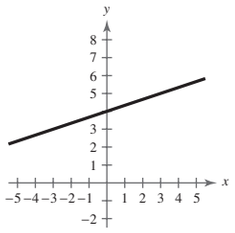
7. $(3 + x)(7 - x)$ **8.** $x(1 + x)(1 - 6x)$

9. $2(3 - 2x)(9 + 6x + 4x^2)$

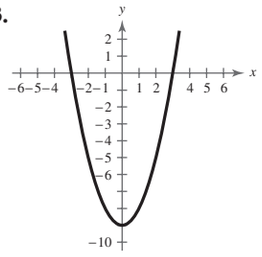
10. Midpoint: $\left(-\frac{1}{2}, -2\right)$; $d = 6\sqrt{5} \approx 13.42$

11. $\left(x + \frac{1}{2}\right)^2 + (y + 8)^2 = 16$

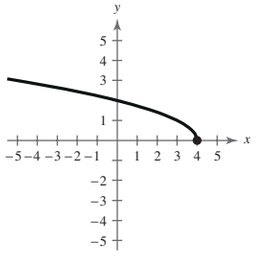
12.



13.



14.



15. (a) $x + y = 3$

(b) Answers will vary.
Sample answer: $(-1, 4), (0, 3), (1, 2)$

16. (a) $2x + y = 0$

(b) Answers will vary.
Sample answer: $(0, 0), (1, -2), (2, -4)$

17. (a) $x = -\frac{3}{7}$

(b) Answers will vary.
Sample answer: $\left(-\frac{3}{7}, 0\right), \left(-\frac{3}{7}, 1\right), \left(-\frac{3}{7}, -3\right)$

18. (a) $y - 6x = -9$ (b) $y + \frac{1}{6}x = \frac{10}{3}$

19. (a) $\frac{5}{3}$ (b) Undefined (c) $\frac{5 + 4s}{3 + 4s}$

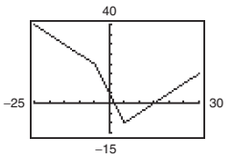
20. (a) -32 (b) 4 (c) 20 **21.** $(-\infty, \infty)$

22. $\left[-\frac{5}{7}, \infty\right)$ **23.** $[-3, 3]$

24. $\left(-\infty, -\frac{2}{5}\right) \cup \left(-\frac{2}{5}, \infty\right)$ **25.** Odd

26. No. It doesn't pass the Vertical Line Test.

27.



Decreasing on $(-\infty, 5)$
Increasing on $(5, \infty)$

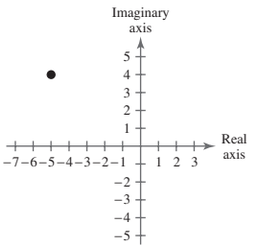
28. (a) Vertical shrink (b) Vertical shift two units up

(c) Horizontal shift two units left, reflection in x-axis

29. $x^2 + 4x + 3$ **30.** $-x^2 + 4x - 1$ **31.** $4x^2 + 9$

32. $4x^3 + x^2 + 8x + 2$ **33.** $h^{-1}(x) = \frac{x + 2}{5}$

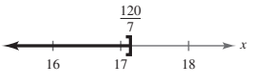
34.



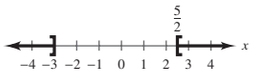
35. 0, 1, 2

36. -3 **37.** $-0.667, -2$ **38.** 4.444

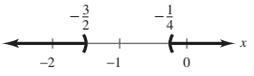
39. $\left(-\infty, \frac{120}{7}\right]$



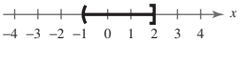
40. $\left(-\infty, -3\right], \left[\frac{5}{2}, \infty\right)$



41. $\left(-\infty, -\frac{3}{2}\right), \left(-\frac{1}{4}, \infty\right)$



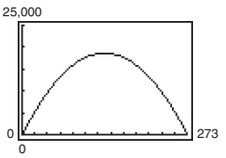
42. $(-1, 2]$



43. ≈ 4.456 inches

44. (a) $A = x(273 - x)$

(b)



$0 < x < 273$

(c) ≈ 76.2 feet $\times$ 196.8 feet

CHAPTER 2