62. (a) $5(2.7 - 9.4)$ (b) $2(-4 + 2)$

Section R1.3 *(page R27)*

2. 729 **4.** 16 **6.** 256 **8.** 81 **10.** $\frac{1}{4}$ **12.** $\frac{27}{8}$

14. $\frac{1}{12}$ **16.** $-110{,}592$ **18.** $-\frac{5}{4}$ **20.** 1 **22.** $\frac{1}{2}$

24. 5 **26.** $-32w^5$ **28.** $5x^6$ **30.** $125x^9$

32. $48y^{11}$ **34.** $3x^2$ **36.** $\frac{5x}{3} + 5$ **38.** $\frac{5}{z^2}$ **40.** 1

42. 2^{4m} **44.** $1, x \neq -5$ **46.** $\frac{1}{(x + y)^2}$ **48.** $-2x^3$

50. $\frac{25}{y^2}$ **52.** $\frac{y^2}{4z^4}$ **54.** 1.395×10^8 square miles

56. 1×10^{-7} meter **58.** 15,000,000°C

60. 0.00009 meter **62.** 1×10^{-16} second

64. (a) 2.94×10^6 (b) 2.0×10^7

66. (a) 4.14×10^2 (b) 1.487×10^{-2}

68. (a) 7.63×10^{-1} (b) 1.422×10^{-5}

70. No. Let $a = -1$ and $n = 2$; then $-1^2 = -1$ and $(-1)^2 = 1$.

72. (a) \$6,395.05 (b) \$6,390.30

(c) \$6371.97 (d) \$6325.12

As the number of compoundings per year increases, the balance in the account also increases.

74. $\approx 2.17\%$

Section R1.4 *(page R36)*

2. $64^{1/3} = 4$ **4.** $-\sqrt{144} = -12$

6. $\sqrt[3]{614.125} = 8.5$ **8.** $(-243)^{1/5} = -3$

10. $81^{3/4} = 27$ **12.** $\sqrt[4]{16^5} = 32$ **14.** 4 **16.** 0

18. 1 **20.** 562 **22.** 3 **24.** 64 **26.** $\sqrt{10}$

28. $\frac{2}{3}$ **30.** $-\frac{3}{5}$ **32.** $3x^2$ **34.** $2x\sqrt[5]{3}$

36. $\frac{2x^2y\sqrt{2y}}{|z|}$ **38.** $\frac{\sqrt{10}}{2}$ **40.** $\frac{\sqrt[3]{5x}}{x}$

42. $\frac{x(\sqrt{14} + 2)}{2}$ **44.** $\frac{2\sqrt{10} + 5}{3}$ **46.** 16

48. $5^{-1/2}$ **50.** 1 **52.** $|x|$ **54.** $3x^2$

56. $(x + 2)^{2/3}$ **58.** $13\sqrt{x + 1}$ **60.** $\sqrt{3}$

62. $13\sqrt{5}$ **64.** 7.550 **66.** 75.686 **68.** 0.516

70. -0.134 **72.** $\sqrt{3} - \sqrt{2} < \sqrt{3 - 2}$

74. $5 = \sqrt{3^2 + 4^2}$ **76.** $\sqrt{\frac{3}{11}} = \frac{\sqrt{3}}{\sqrt{11}}$

78. $20\sqrt{2}$ feet $\times$ $20\sqrt{2}$ feet **80.** $\approx 14.87\%$

82. Yes. The escape velocity is equal to approximately 5041 meters per second, which is less than the rocket's velocity.

84. ≈ 1.360 seconds **86.** $\frac{\sqrt{5}}{100}$ inch

88. ≈ 523 vibrations per second

90. b; Higher notes have higher frequencies.

92. $\left(2/\sqrt{5}\right)^2 = \frac{4}{5}$. This is not the same as rationalizing the denominator, which gives the result $2/\sqrt{5} \cdot \sqrt{5}/\sqrt{5} = \left(2\sqrt{5}\right)/5$.

94. $\sqrt{4x^2} \geq 0$, whereas $2x$ can be less than zero.

Section R1.5 *(page R46)*

2. Degree: 4
Leading coefficient: -3

4. Degree: 0
Leading coefficient: 3

6. Degree: 1
Leading coefficient: -3

8. Not a polynomial

10. Polynomial, $\frac{2}{3}x^2 + \frac{5}{3}x - 1$, degree 2

12. Not a polynomial

14. (a) -2 (b) -5 (c) -6 (d) -5

16. (a) -6 (b) 0 (c) -2 (d) -6

18. $x^2 + 2x - 2$ **20.** $-8x^2 + 6$ **22.** $2x^4 - 13x - 34$

24. $2z^4 + 3z^3 + z^2$ **26.** $5y^3 - 10y$ **28.** $-4x^4 + 4x$

30. $x^2 + 5x - 50$ **32.** $28x^2 - 29x + 6$ **34.** $9x^2 - 4$

36. $9x^2 - 12x + 4$ **38.** $64x^2 - 80x + 25$

40. $x^2 + 2x - 2xy - 2y + y^2 + 1$

42. $x^3 - 6x^2 + 12x - 8$

44. $27x^3 + 54x^2y + 36xy^2 + 8y^3$ **46.** $9x^4 - 16y^4$

48. $x^2 + 2xy + y^2 - 1$ **50.** $25 - x$

52. $x^4 - 13x^2 + 4$ **54.** $2x^2 + 8x + 6$

56. $1200r^3 + 3600r^2 + 3600r + 1200$ **58.** \$6595.93; Yes

60. 2250; 2423; In the years 2001 and 2002, the average Federal Pell Grant awards were \$2250 and \$2423, respectively.

62. Volume $= 4x^3 - 180x^2 + 2025x$
$x = 6$ inches: $V = 6534$ cubic inches
$x = 8$ inches: $V = 6728$ cubic inches
$x = 10$ inches: $V = 6250$ cubic inches

V is greatest when $x = 8$ inches.

64. $40x + 240$

Section R1.6 *(page R53)*

2. $6(y - 5)$ **4.** $2x(2x^2 - 3x + 6)$

6. $(3x - 4)(x + 2)$ **8.** $\left(x + \frac{1}{3}\right)\left(x - \frac{1}{3}\right)$

10. $(7 + 3y)(7 - 3y)$ **12.** $-z(z + 10)$ **14.** $(x + 5)^2$

16. $(3x - 2)^2$ **18.** $\left(z + \frac{1}{2}\right)^2$ **20.** $(x - 3)(x^2 + 3x + 9)$

22. $(z + 4)(z^2 - 4z + 16)$ **24.** $(3x + 2)(9x^2 - 6x + 4)$

5. $(x + 2)(x + 3)$ **28.** $(z - 3)(z + 2)$

30. $(z - 8)(z + 3)$ **32.** $(x - 6)(x - 7)$

34. $(2x + 1)(x - 1)$ **36.** $(3y + 1)(4y + 1)$

38. $(5u - 2)(u + 3)$ **40.** $(x^2 - 5)(x + 5)$

42. $(5x^2 + 3)(x - 2)$ **44.** $(z + 1)(z^2 - z + 1)(z^2 + 2)$

46. $12(x + 2)(x - 2)$ **48.** $3(x + 4)(x - 4)$

50. $6(y + 3)(y - 3)$ **52.** $(8 - x)(2 + x)$

54. $(3x - 1)^2$ **56.** $(9x + 1)(x + 1)$

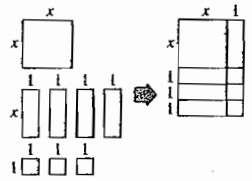
58. $(5x + 3)(x + 2)$ **60.** $(5 - x)(1 + x^2)$

62. $(u + 2)(3 - u^2)$ **64.** $(t + 6)(t - 8)$

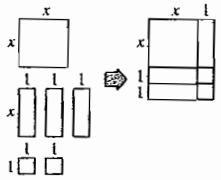
66. $(x + 2)(x + 4)(x - 2)(x - 4)$

68. $5(x + 2)(x^2 - 2x + 4)$

70.



72.



74. $(3x + 2)$ feet

76. $b = \{-13, -8, -7, 7, 8, 13\}$; Answers will vary.

78. Answers will vary.

80. Box 1: $V = (a - b)a^2$
Box 2: $V = (a - b)ab$
Box 3: $V = (a - b)b^2$
Multiplying $(a - b)$ by each term of $(a^2 + ab + b^2)$ produces the volumes of the three boxes.

Section R1.7 *(page R60)*

2. All real numbers greater than 0

4. All real numbers except $x = -\frac{1}{2}$

6. All real numbers except $x = 4$ and $x = -4$

8. All real numbers greater than -1

10. $x + 1, x \neq -1$ **12.** $y - 1, y \neq 1$

14. $z + 1, z \neq -1$ **16.** $\frac{3}{10y^3}$ **18.** $\frac{9x}{2}, x \neq -1$

20. $-\frac{1}{8}, x \neq 3$ **22.** $-x - 4, x \neq 4$

24. $\frac{x - 2}{x + 1}, x \neq -10$ **26.** $\frac{1}{x - 4}, x \neq -1$

28. $\frac{1}{x + 1}, x \neq \pm 3$ **30.** $\frac{y(y - 3)}{y^2 - y + 1}, y \neq -1$

32. $-\frac{x + 13}{5x^2}, x \neq 3$ **34.** $\frac{x - 3}{(x + 2)^2}, x \neq -5$

36. $-\frac{8}{5}, y \neq -3, 4$ **38.** $\frac{2(y^2 + 2y + 4)}{y^2(y - 3)}, y \neq 2$

40. $\frac{(x^3 + 1)(x^2 + x + 1)}{(x + 1)^2}, x \neq 1$ **42.** $\frac{x + 2}{x - 2}, x \neq 3$

44. $\frac{x + 1}{x - 1}, x \neq 0$ **46.** $\frac{x}{x + 3}$

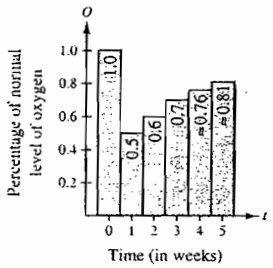
48. $-\frac{2}{x - 2}$ **50.** $\frac{8 - 5x}{x - 1}$ **52.** $\frac{1}{(x + 2)(x - 1)}$

54. $\frac{4x + 1}{x^2 - 1}$ **56.** $\frac{4x^2 - 12x}{x^2 - 16}, x \neq 0$

58. $\frac{1}{2y + 1}, y \neq 0, -\frac{5}{4}$ **60.** $\frac{1}{(x + 1)(x + 5)}$

62. (a) 12% (b) $\frac{288(NM - P)}{N(12P + NM)}$

64.



; Answers will vary.

Review Exercises *(page R64)*

2. (a) Natural: $\{\}$

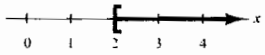
(b) Integer: $\{-22, 0\}$

(c) Rational: $\{-22, -\frac{10}{3}, 0, 5.2, \frac{3}{7}\}$

(d) Irrational: $\{\sqrt{15}\}$

4. $\frac{1}{5} > \frac{1}{6}$

6. $x \geq 2$ denotes all real numbers greater than or equal to 2.



8. $2 < x \leq 5$ **10.** 6 **12.** $|9| = |-9|$ **14.** 10

16. $|x - 25| \leq 10$ **18.** $3x^3, -9x$

20. (a) -8 (b) -33 **22.** Associative (addition)

24. 4 **26.** $\frac{7}{6}$ **28.** 256 **30.** -1.50 **32.** $-\frac{3}{2}$

34. $-108x^3$ **36.** 3.048×10^{-1} **38.** 0.00274

40. (a) 67,429,958 (b) 0.713

42.

Year	5	10	15
Balance	$13,140.67	$17,267.71	$22,690.92

Year	20	25
Balance	$29,817.37	$39,182.01

44. $\sqrt[4]{16} = 2$ **46.** 5 **48.** $\frac{\sqrt[3]{2}x}{3}$ **50.** $-6 - 2\sqrt{10}$

52. $14\sqrt{2}$ **54.** 16 **56.** $\sqrt{x}$ **58.** 3.733

60. $-9x^2 - 9x + 6$ **62.** $5x^2 - x$ **64.** $x^2 - 25$

66. $4x^2 + 4x + 1$

68. 162.74

In 2002, the median sales price for a new one-family home in the southern United States was \$162,740.

70. $x = 5$: 19,879, $x = 12$: 143,051.28

There were roughly 19,879 and 143,051 cell sites in the United States in 1995 and 2002, respectively.

72. $(x + 1)(x - 5)$ **74.** $x(x + 4)(x - 4)$

76. $(x - 5)(x^2 + 5x + 25)$

78. All real numbers except $x = -1$

80. All real nonnegative numbers

82. $x + 2$ **84.** $x - 5, x \neq -3$ **86.** $x(x + 3), x \neq 1$

88. $\frac{4x}{x - 4}, x \neq -2$ **90.** $-\frac{x + 10}{(x + 2)(x - 2)}$

92. $\frac{4x}{x + 4}, x \neq 0, 4$ **94.** $\frac{y - x}{y + x}, xy \neq 0$

Chapter R2

Section R2.1 *(page R76)*

2. Identity **4.** Conditional equation

6. Conditional equation

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

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

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

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

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

18. -11 **20.** 2 **22.** -4 **24.** 3

26. No solution **28.** -10 **30.** 6 **32.** 50

34. $-\frac{5}{8}$ **36.** $\frac{1}{2}$ **38.** 0 **40.** $\frac{9}{7}$ **42.** $\frac{7}{4}$

44. $x = 4$ appears to be a solution, but after checking, it is found to be an extraneous solution, so there is no solution.

46. $-\frac{13}{3}$ **48.** 0 **50.** $\frac{1}{5}$ **52.** No solution

54. No solution

56. Extraneous solutions may arise when a fractional expression is multiplied by factors involving the variable.

58. Equivalent equations have the same solutions.

Example: $2x - 6 = 0$ and $x - 3 = 0$ both have the solution $x = 3$.

60. $x \approx 1.326$ **62.** $x \approx -2.386$ **64.** $x \approx 1.706$

66. Rounding will cause a check to be a little off. For exan if $x \approx 1.327$ is a rounded solution of the equa $x^2 = 1.761$, then when 1.327 is squared, it will not exa equal 1.761.

68. (a) 13.93 (b) 14.38; Yes

70. (a) 0.58 (b) 0.57; Yes

72. 2006 ($t \approx 16.26$)

74. Yes; From the equation, a male that is 69 inches tall h femur length of 18.831 inches, which is reasonably clos 19 inches.

76. Answers will vary. **78.** 2005 ($t \approx 15.21$)

Section R2.2 *(page R87)*

2. $n(25 - n) = 25n - n^2$ **4.** $\frac{200}{r}$ **6.** $0.8L$

8. $10h$ **10.** $3.59x$

12. $804 = n + (n + 1) + (n + 2)$; 267, 268, 269

14. $76 = x - \frac{1}{5}x$; 19, 95 **16.** $\frac{1}{4n} = \frac{1}{n} - \frac{1}{n + 1}$; 3, 4

18. January: \$71,590; February: \$85,908

20. January: \$87,498.89; February: \$69,999.11

22. $\approx$ 6.52% increase **24.** $\approx$ 27.93% decrease

26. (a) \$71,175,112,000 (b) \$74,449,167,150

(c) \$73,481,327,980

28. Small: $\approx$ 1,771,724 cars

Midsize: $\approx$ 4,516,649 cars

Large: $\approx$ 432,534 cars

Luxury: $\approx$ 1,081,334 cars

30. $\approx$ 0.57 feet $\times$ 0.93 feet **32.** $\approx$ 9.52%

34. 187 or greater **36.** \$20,828.10

38. \$554.44 **40.** 40.04%

42. Percent increase needed: $\approx$ 17.65%

A higher percent increase is needed because you are takin a percentage of a smaller number.

44. $\approx$ 3.82 hours **46.** 2.75 hours

48. $\approx$ 46.3 miles per hour **50.** $\approx 2.93 \times 10^{14}$ miles

52. $\approx$ 57.14 feet **54.** \$518,925

56. 3%: \$11,250; 4.5%: \$13,750

58. First three quarters: 11.5%; Last quarter: 10%

60. 8064 units per month

62. $\approx$ 0.26 foot **64.** $\approx$ 0.48 gallon

66. $\approx$ 11.04 miles per hour **68.** $l = \frac{P - 2w}{2}$

70. $h = \dfrac{V}{\pi r^2}$ **72.** $L = \dfrac{S}{1 - R}$ **74.** $P = \dfrac{A}{\left(1 + \dfrac{r}{n}\right)^{nt}}$

76. $\theta = \dfrac{360A}{\pi r^2}$ **78.** $r = \dfrac{S - a}{S - L}$ **80.** $l = \dfrac{S - \pi r^2}{\pi r}$

82. "From 100 to 200 feet," "takes 30 minutes," "from a depth of 150 feet"

Section R2.3 *(page R100)*

2. $4x^2 - 2x - 9 = 0$ **4.** $10x^2 - 90 = 0$

6. $-3x^2 - 42x - 135 = 0$ **8.** $x^2 + 3x - 10 = 0$

10. $x^2 - 6x - 7 = 0$ **12.** 1, 9 **14.** $\pm\frac{1}{3}$ **16.** $-\frac{7}{4}$

18. $-\frac{3}{2}$, 11 **20.** -7, 3 **22.** 2, 6 **24.** ± 12

26. $\pm 3\sqrt{3} \approx \pm 5.20$ **28.** $\pm\frac{5}{3} \approx \pm 1.67$

30. $-13 + \sqrt{21} \approx -8.42$ **32.** $-5 + 2\sqrt{5} \approx -0.53$

$-13 - \sqrt{21} \approx -17.58$ $-5 - 2\sqrt{5} \approx -9.47$

34. $\pm\dfrac{5\sqrt{15}}{3} \approx \pm 6.45$ **36.** $\pm\dfrac{5}{2} = \pm 2.50$

38. $\pm\dfrac{4\sqrt{14}}{7}$ **40.** 1, 5 **42.** 0, -3 **44.** 7

46. $5 \pm 2\sqrt{2}$ **48.** $\frac{10}{3}$, $-\frac{8}{3}$ **50.** 16, $\frac{9}{4}$

52. $\frac{3}{4}$, $\frac{5}{2}$ **54.** $-\frac{1}{3}$, -1 **56.** -1, 5 **58.** $-\frac{1}{3}$, 1

60. From geometry, the Pythagorean Theorem states that $c = \sqrt{a^2 + b^2}$, where c is the length of the hypotenuse of a right triangle and a and b are the lengths of the legs. Then $\sqrt{a^2 + b^2} \neq a + b$ because c cannot be equal to $a + b$. Using a graphing utility, have your classmate select two values for a and b; then $\sqrt{a^2 + b^2}$ will be different from $a + b$. (a and b should be nonzero.)

62. 14 feet × 24 feet **64.** 80 feet × 80 feet × 120 feet

66. ≈ 8.11 seconds **68.** 2.5 seconds

70. ≈ 11.18 seconds **72.** ≈ 1.15 feet

74. ≈ 2121.32 feet **76.** 2006 ($t \approx 16.26$)

78. 30,000 units **80.** 2008 ($t \approx 8.3$)

82. 2009 ($t \approx 10.92$) **84.** S = \$121.88 billion; Yes

Section R2.4 *(page R110)*

2. Two real solutions **4.** No real solutions

6. One real solution **8.** No real solutions

10. 1, $-\frac{1}{2}$ **12.** $\frac{3}{5}$, $\frac{1}{5}$ **14.** $5 \pm \sqrt{3}$ **16.** $-3 \pm \sqrt{13}$

18. $\dfrac{1}{2} \pm \dfrac{\sqrt{5}}{2}$ **20.** $\dfrac{5}{4} \pm \dfrac{\sqrt{3}}{4}$ **22.** $-\dfrac{3}{2} \pm \dfrac{\sqrt{13}}{2}$

24. $\dfrac{5}{4} \pm \dfrac{\sqrt{5}}{2}$ **26.** $-\dfrac{4}{3}$ **28.** $-\dfrac{8}{5} \pm \dfrac{\sqrt{3}}{5}$

30. $-7 \pm \sqrt{13}$ **32.** $x \approx -0.178, -0.649$

34. $x \approx 2.137, 18.063$ **36.** $x \approx 1.400, -0.150$

38. 5 **40.** No real solution **42.** -4, 1

44. 3, -1 **46.** $\frac{11}{8}$ **48.** 8, 9 or -9, -8

50. 20, 22 or -22, -20 **52.** 100 units **54.** 48 units

56. 35 feet × 20 feet or ≈ 46.7 feet × 15 feet

58. 6 inches × 6 inches

60. First sack. When the second sack is dropped, the first sack needs only about 2.54 seconds to hit the ground.

62. Moon: $t \approx 10.2$ seconds **64.** ≈73.48 feet

Earth: $t \approx 1.9$ seconds

66. 2010 ($t = 20$) **68.** 2006 ($t \approx 5.97$)

70. Eastbound: ≈578 miles per hour
Southbound: ≈478 miles per hour

72. 5279 units or 94,721 units

Section R2.5 *(page R123)*

2. 0, $\pm\frac{5}{2}$ **4.** 0, $\frac{3}{2}$, 6 **6.** ± 2 **8.** 0, $\frac{4}{3}$ **10.** -2

12. ± 2 **14.** $\pm 2, \pm 5$ **16.** $\pm\sqrt{3}, \pm 1$

18. $\pm\dfrac{\sqrt{7}}{6}$ **20.** $-1, -\sqrt[3]{2}$ **22.** $\dfrac{9}{16}$ **24.** -4

26. $\frac{124}{3}$ **28.** $\frac{9}{4}$ **30.** $\frac{3}{2}$ $\left(-\frac{5}{2}\text{ is extraneous}\right)$

32. -2, 3 **34.** 4 (12 is extraneous) **36.** 5, -11

38. ± 5 **40.** $-5, 6, \dfrac{1 \pm \sqrt{57}}{2}$ **42.** $\dfrac{1}{3} \pm \dfrac{\sqrt{31}}{3}$

44. -12, 2 **46.** 2 **48.** -1, 1 **50.** $-1, 5$

52. $-3, \frac{5}{3}$ **54.** $-6, -3, 3$ **56.** $3, \dfrac{-1 - \sqrt{17}}{2}$

58. The equation was not FOILed.
$\left(\sqrt{6 - 2x} - 3\right)^2 \neq 6 - 2x + 9$

60. $x \approx -1.143$; $x \approx 0.968$ **62.** No real solutions

64. \$1200 **66.** (a) ≈ 4.61% (b) ≈ 6.31%

68. ≈ 18.75%

70. (a)

t	3	5	10	11
S (in millions)	5.57	6.54	8.81	9.25

(b) 2027 ($t \approx 37.31$)

72. 2005 ($t \approx 15.20$) **74.** 0.26 mile or 1 mile

76. 5 consecutive hits **78.** $5\frac{5}{11}$ hours

Section R2.6 *(page R134)*

2. $2 < x \leq 10$; Bounded **4.** $x \geq -5$; Unbounded

6. $x \leq 7$; Unbounded

7. c **8.** h **9.** f **10.** e

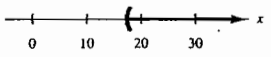
1. g **12.** a **13.** b **14.** d

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

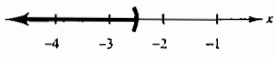
8. (a) No (b) No (c) Yes (d) No

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

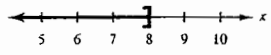
2. $x > \frac{35}{2}$



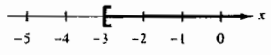
24. $x < -\frac{5}{2}$



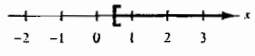
6. $x \leq 8$



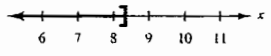
28. $x \geq -3$



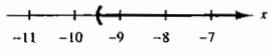
0. $x \geq \frac{1}{2}$



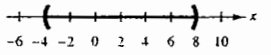
32. $x \leq \frac{25}{3}$



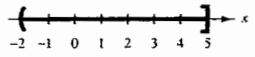
4. $x > -\frac{19}{2}$



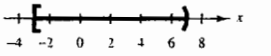
36. $-4 < x < 8$



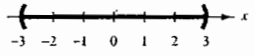
8. $-2 < x \leq 5$



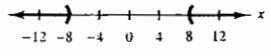
40. $-3 \leq x < 7$



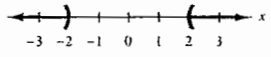
12. $-3 < x < 3$



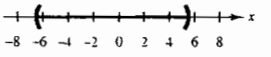
44. $x < -8, x > 8$



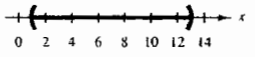
16. $x < -2$ or $x > 2$



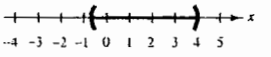
48. $-\frac{13}{2} < x < \frac{11}{2}$



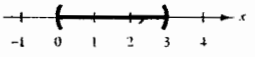
50. $1 < x < 13$



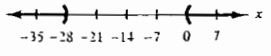
52. $-\frac{2}{3} < x < 4$



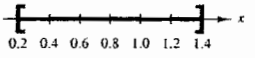
54. $0 < x < 3$



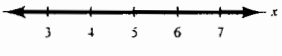
56. $x < -28, x > 0$



58. $0.2 \leq x \leq 1.4$



60. All real numbers x



62. $|x| > 2$ **64.** $|x + 2| \leq 4$ **66.** $|x - 8| \geq 5$

68. $|x + 6| \leq 7$ **70.** More than 42.857

72. Greater than 25% **74.** 5 years

76. $x \geq 16{,}394$ units

78. Between 133 dozen and 233 dozen doughnuts

80. (a) $x \geq 181.54$ pounds

(b) No. Muscle mass is a better indication of strength.

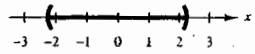
82. 2021 ($t > 21.9$) **84.** [$\approx 573.603, \approx 597.803$]

86. Undercharged or overcharged by as much as \$0.17

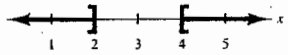
88. (13.7, 17.5) **90.** From 97.6° to 99.6°

Section R2.7 *(page R145)*

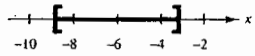
2. $-\sqrt{5} < x < \sqrt{5}$



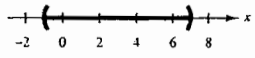
4. $x \leq 2$ or $x \geq 4$



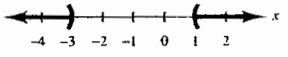
6. $-6 - 2\sqrt{2} \leq x \leq -6 + 2\sqrt{2}$



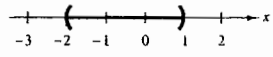
8. $-1 < x < 7$



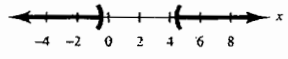
10. $x < -3$ or $x > 1$



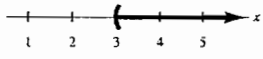
12. $-2 < x < 1$



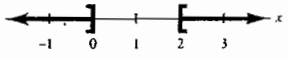
14. $x < 2 - \sqrt{5}$ or $x > 2 + \sqrt{5}$



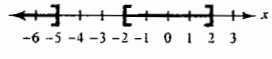
16. $x > 3$



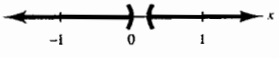
18. $x \leq 0$ or $x \geq 2$



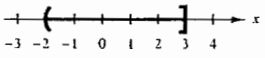
20. $x \leq -5, -2 \leq x \leq 2$



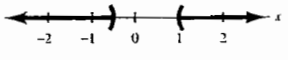
22. $x < 0$ or $x > \frac{1}{4}$



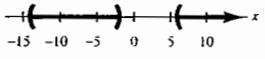
24. $-2 < x \leq 3$



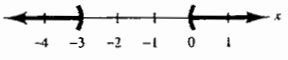
26. $x < -\frac{1}{2}$ or $x > 1$



28. $-14 < x < -2$ or $x > 6$



30. $x < -3$ or $x > 0$



32. $(-\infty, -2], [2, \infty)$ **34.** $[-4, 4]$ **36.** $[-4, 3]$

38. All real numbers **40.** The domain is empty.

42. It is not possible to find an even root of a negative number and have that root be a real number, whereas it is possible to take an odd root of any real number.

44. $-1.13 < x < 1.13$ **46.** $-4.42 < x < 0.42$

48. $1.19 < x < 1.30$

50. Between 0 and about 1.17 seconds, and between about 6.83 and 8 seconds.

52. ≈ 6.48 feet $\leq l \leq \approx 18.52$ feet

54. (a) $40{,}000 \leq x \leq 50{,}000$ (b) $\$50 \leq p \leq \$55$
(c) 84,052 units

56. 6.27% **58.** 2007 ($t > 26.68$)

60. 2005 ($t > 14.89$); No. After 2022, the model predicts negative values for D, which does not make sense.

Review Exercises *(page R150)*

2. Identity **4.** (a) No (b) No (c) No (d) No

6. $-\frac{5}{3}$ **8.** 2 **10.** -8

12. 0.078 **14.** \$25,970

16. Apparel/Clothing: \$3711.84 million
Toys/Video Games: \$2249.60 million
Consumer electronics: \$2024.64 million
Computer hardware/peripherals: \$1687.20 million
Video/DVD: \$1574.72 million

18. 20 feet × 25 feet **20.** 4.5% **22.** 10%

24. \$870,224 **26.** 2.625 gallons. **28.** $-3, -12$

30. $-\frac{5}{2}, 3$ **32.** $\pm\frac{5}{4} = \pm 1.25$

34. $1 + \sqrt{5} \approx 3.24$; $1 - \sqrt{5} \approx -1.24$

36. The student may have neglected to consider positive and negative square roots. Show the student that $-\sqrt{11} \approx -3.32$ and that $\left(-\sqrt{11}\right)^2$ is 11. The *table* feature of a graphing utility could also be used to demonstrate that $\sqrt{11}$ and $-\sqrt{11}$ are both solutions to Exercise 31.

38. ≈ 19.36 seconds **40.** ≈ 1414.21 feet

42. No real solutions **44.** $\dfrac{-8 \pm 2\sqrt{31}}{5}$

46. $\dfrac{-3 \pm \sqrt{23}}{2}$ **48.** $\dfrac{11 \pm \sqrt{201}}{20}$ **50.** 8.544, 0.162

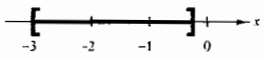
52. 17 inches × 17 inches **54.** $\pm 2, \pm 1$

56. $-3, 1$ **58.** 2 (9 is extraneous) **60.** 40

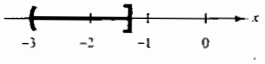
62. $-2, 7, \dfrac{5 \pm \sqrt{17}}{2}$ **64.** $-4, -2, 2$

66. $-1, 1$ **68.** 36 students **70.** $\approx 143{,}203$ units

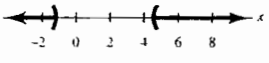
72. $-3 \leq x \leq -\frac{1}{4}$



74. $-3 < x \leq -\frac{4}{3}$

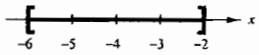


76. $x < -\frac{3}{2}$ or $x \geq \frac{9}{2}$

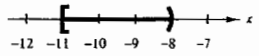


78. Up to \$0.56

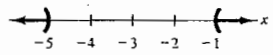
80. $-6 \leq x \leq -2$



82. $-11 \leq x < -8$



84. $x < -5$ or $x > -1$ **86.** $-2.41 < x < 1.01$



88. $x < 0.50$ or $x > 0.56$ **90.** $x \geq -\frac{5}{2}$

92. All real numbers **94.** $-\frac{9}{2} \leq x \leq \frac{9}{2}$

96. Between 2.5 and 3.75 seconds

98. Greater than 9.5% **100.** $\$37.75 \leq p \leq \$$

102. (a)

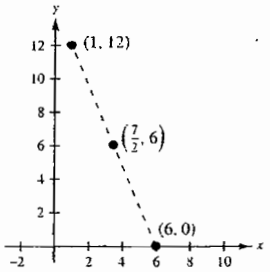
t	1	3	5	7	9
T	20,165	21,599	23,369	25,475	27,918

(b) 2010 ($t \geq 20$)

Chapter 1

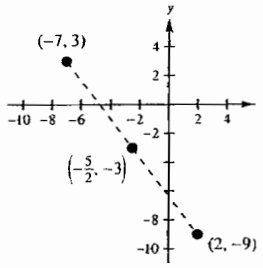
Section 1.1 *(page 12)*

2. (a)



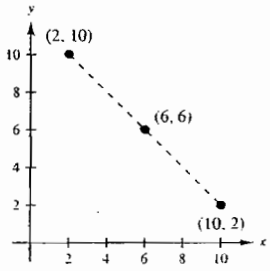
(b) 13 (c) $\left(\frac{7}{2}, 6\right)$

4. (a)



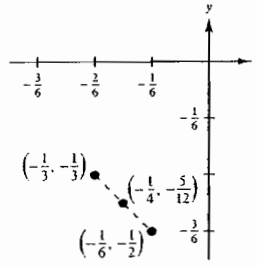
(b) 15 (c) $\left(-\frac{5}{2}, -3\right)$

6. (a)



(b) $8\sqrt{2}$ (c) (6, 6)

8. (a)



(b) $\frac{\sqrt{2}}{6}$ (c) $\left(-\frac{1}{4}, -\frac{5}{12}\right.$