Exercise Set 1.1

1. $7 < 9$

3. $-8 > -12$

5. $-4 < -3$

7. $12 < |-15|$

9. $|-6| > |4|$

11. $-1, |0|, |-2|, 3, 7, |-11|$

13. $-5, -2, 0, 1, |-6|, |-7|, |11|$

15. -2

17. -21

19. 4

21. -42

23. -7

25. -9

27. -12

29. -5

31. -45

33. -40

35. -63

37. -9

39. -9

41. -7

43. -20

45. 125

47. 16

49. 64

51. −16

53. 17

55. −3

57. −3

59. −28

61. 6

63. −11

65. −9

67. 48

69. −75

71. −304

73. −395 Maria borrows $395.

75. 2528 years

<u>Exercise Set 1.2</u>

1. $2^2 \cdot 3^2$

3. $2^2 \cdot 5^2$

5. $2^2 \cdot 5 \cdot 11$

7. 90

9. 1080

11. 7560

13. 6

15. 56

17. 84

19. 630 students

21. 24 exams

Exercise Set 1.3

1. $\frac{7}{2}$

3. $\frac{53}{8}$

5. $-\frac{39}{7}$

7. $-\frac{107}{7}$

9. $4\frac{3}{5}$

11. $8\frac{5}{9}$

13. $-4\frac{3}{4}$

15. 0.625

17. $9.\overline{3}$

19. 3.2

21. -12.1875
23. $-16.\overline{5}$

25. $32.8\overline{3}$

27. $\frac{57}{100}$

29. $\frac{532}{100}$

31. $\frac{562}{1000}$

33. $\frac{3}{7}$

35. $\frac{5}{6}$

37. $\frac{1}{2}$

39. $\frac{4}{15}$

41. $\frac{1}{9}$

43. $-\frac{4}{21}$

45. $\frac{2}{15}$

47. $12\frac{1}{4}$

49. $-39\frac{5}{27}$

51. $27\frac{1}{2}$

53. $\frac{5}{6}$

55. $-1\frac{1}{2}$

57. $\frac{128}{375}$

59. $-1\frac{1}{3}$

61. $1\frac{11}{16}$

63. $-1\frac{7}{8}$

65. $\frac{1}{3}$

67. $\frac{4}{9}$

69. $\frac{25}{49}$

71. $7\frac{9}{16}$

73. $\frac{5}{7}$

75. $\frac{5}{9}$

77. $\frac{11}{12}$

79. $\frac{19}{60}$

81. $-\frac{8}{15}$

83. $-\frac{67}{75}$

85. $14\frac{1}{2}$

87. $-4\frac{11}{18}$

89. $8\frac{7}{12}$

91. $-2\frac{1}{18}$

93. $-\frac{1}{18}$

95. $-\frac{5}{23}$

97. $\frac{1}{3}$

99. $\frac{37}{60}$

101. $-\frac{7}{20}$

103. $\frac{5}{18}$

105. $1\frac{7}{15}$

107. $-6\frac{11}{14}$

109. $7\frac{3}{5}$ gallons of gas

By Will Tenney

Exercise Set 1.4

1. 7

3. 8

5. 36

7. 12.530

9. 4,488.943

11. $4\sqrt{2}$

13. $8\sqrt{2}$

15. $15\sqrt{3}$

17. $165\sqrt{2}$

19. $3\sqrt{10}$

21. $10\sqrt{21}$

23. $196\sqrt{3}$

25. $420\sqrt{6}$

27. $5\sqrt{3} + 5$

29. $7\sqrt{2} - 7$

31. $30 + 45\sqrt{3}$

33. $70\sqrt{3} - 56$

35. $9\sqrt{3}$

37. $9\sqrt{5} - 7\sqrt{10}$

39. $13\sqrt{3}$

41. $8\sqrt{2}$

43. a. 792.96 km/hour
    b. 340.05 km/hour
    c. As the depth of the water decreases, the velocity of the Tsunami decreases.

45. 8.82 seconds

Exercise Set 1.5

1. 81

3. 16

5. -16

7. 1

9. -1

11. 64

13. 32

15. 81

17. 4096

19. $\frac{1}{16}$

21. $-\frac{1}{25}$

23. $\frac{1}{16}$

25. -1

27. $\frac{1}{27}$

29. 64

31. $\frac{1}{8}$

33. $\frac{1}{27}$

35. $\frac{1}{49}$

37. y^7

39. $\frac{1}{t^5}$

41. $\frac{1}{y^8}$

43. x^5y^4

45. $\frac{x^2}{9}$

47. x^4y^4

49. $\frac{81}{y^4}$

51. $\frac{1}{xy^8}$

53. $\frac{y^5}{x^6}$

55. 3.74×10^{12}

57. 7.624×10^{-9}

59. 1.23×10^{11}

61. 6.2×10^{-6}

63. 5.85×10^{20}

65. 2.6784×10^{18}

67. 3.1×10^{-16}

69. 2.5×10^{-11}

71. 2×10^0 or 2

73. 9.11×10^{72} grams or 9.11×10^{69} kilograms

75. 1.47×10^{19} miles

Exercise Set 2.1

1. 7

3. −5

5. 57

7. $-2\frac{41}{100}$

9. −84

11. 2

13. $\frac{2}{9}$

15. $-\frac{2}{3}$

17. −45

19. 90

21. −4

23. 75

25. −18

27.   a. 71.3 inches
b. The formula overestimates the actual height by 0.3 inches. This trend is not likely to continue indefinitely or men's average height would continually increases. For instance the formula indicates that the average height of men will be about eighteen and a half feet 5000 years from now.

29.   a. 18,000 students
b. The formula overestimates the actual number of students by 200.

Exercise Set 2.2

1. $-10xy$

3. xy

5. $12 + 3x$

7. $-10y - 10$

9. $-1.55t - 8.62$

11. $5x - 7y - 2$

13. $6.34x + 2.5y - 18.11$

15. $20x - 8y + 12$

17. $-20x + 15y + 40$

19. $-2x + 7y - 8$

21. $3x - 15y$

23. $-8s - 14t$

25. $-8x^2 + 11x$

27. $9x^2 - 12x$

29. $-3x^2y + 7xy^2$

31. $-3x + 29$

33. $13x + 1$

35. $5x + 11$

37. $x - 4$

39. $11x - 29$

41. $4x^2 + 2$

43. $2x^2 - 6$

45. $4x^2 + 2x - 12$

47. $4x^2 + 2x$

49. $7x^2 - 18$

51. $-12x - 28$

53. $-20x + 64$

55. $10x + 119$

57. $4x - 47$

59. $y^2 - 9y + 21$

Exercise Set 2.3

1. $x = 10$

3. $x = -14$

5. $x = 1\frac{5}{12}$

7. $x = -0.12$

9. $x = -\frac{7}{8}$

11. $x = -7$

13. $x = 4$

15. $x = -3.5$

17. $x = -\frac{6}{7}$

19. $x = 4$

21. $x = -4$

23. $x = 2$

25. $x = -5$

27. $x = -16$

29. $x = -4$

31. $x = -1$

33. $x = -8$

35. $x = -1$

37. $x = 2\frac{1}{5}$

39. $x = 1\frac{5}{7}$

Exercise Set 2.4

1. $L = \frac{A}{W}$

3. $L = \frac{P-2W}{2}$.

5. $x = \frac{24+4y}{3}$

7. $y = \frac{28-4x}{-7}$.

9. $y = 3A - x - z$.

11. $r = \frac{t-Ms}{M}$

13. $C = \frac{5}{9}(F - 32)$.

15. $t = \frac{A-P}{Pr}$

Exercise Set 3.1

1. $5 + 3x$

3. $2x - 5$

5. $-5x - 5$

7. $-1.88x - 5$

9. $50 - z$

11. $40 - 2x$

13. 48

15. $1\frac{5}{12}$

17. 14 and 26

19. -32 and 25

Exercise Set 3.2

1. The odd integers are 15, 17, and 19.

3. The integers are 18, 19, and 20.

5. The stamp collector purchased thirty 5¢ stamps, ninety 15¢ stamps, and forty 25¢ stamps.

7. In 1968 the average salary for a college instructor was $10,040.

9. 35 cartridges were used over the life of the printer.

11. It will take 57 hours of training for somebody with a SAT Math score of 529 to raise their SAT Math score to 700 if we accept the SAT training program's claim.

13. After sixty hours the costs of the two plans will be the same.

15. After 280 kilowatt hours the costs of the two plans will be the same.

Exercise Set 3.3

1. 0.8 EUR : 1 USD

3. 1.24 CAD : 1 USD

5. $x = 16$

7. $x = 30$

9. $x = 12$

11. $x = 23$

13. 88.2 miles

15. There are about 245 elephants.

17. There are about 63 bears in the wildlife refuge.

19. After 19.5 more months, the employee will have accrued enough vacation days (25 days) to take a five week vacation.

21. An additional $2250 must be invested so that $450 is earned each year.

Exercise Set 3.4

1. 0.12

3. 0.0035

5. $\frac{9}{20}$

7. $\frac{143}{300}$

9. 28%

11. $55\frac{5}{9}\%$

13. $333\frac{1}{3}\%$

15. 73%

17. 16.82%

19. 1229%

21. 43.2

23. 18

25. 52%

27. 192

29. 75

31. 64%

33. There was an 18% increase.

35. There was a 15% decrease.

37. The sale price of the blender is $48.75

39. The regular price of the coffee maker is $132.

41. The value of the car after the first year is $25,004.

43. The wine shop's sale price for the French Chardonnay is $11.70.

45. The supermarket's mark-up rate is 65%.

Exercise Set 3.5

1. $x < 2$
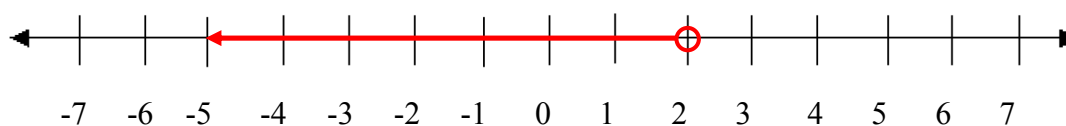
3. $x \leq 2$
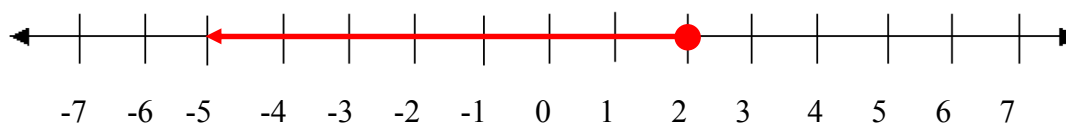
5. $x \leq 1$
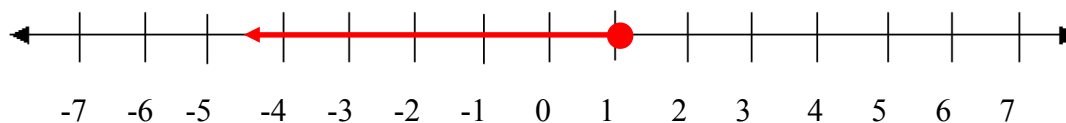
7. $x > -3$
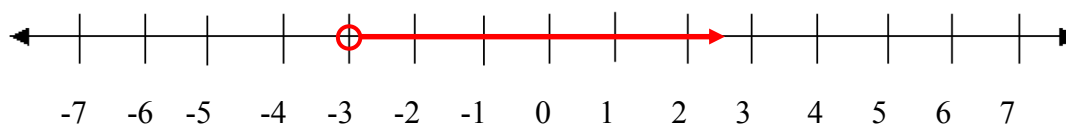
9. $x > -2$
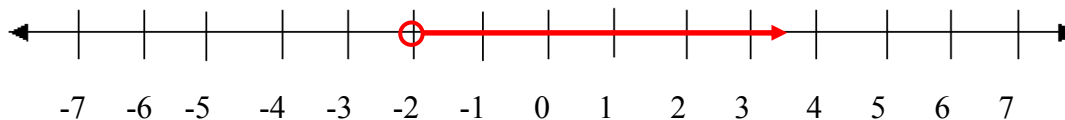
11. $x < 2$
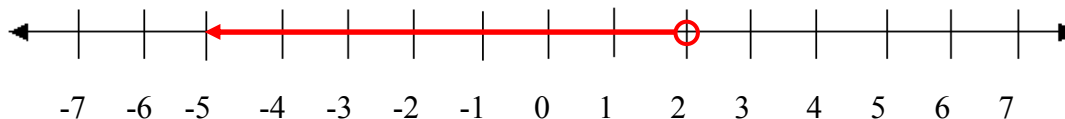
13. $x \geq 3$
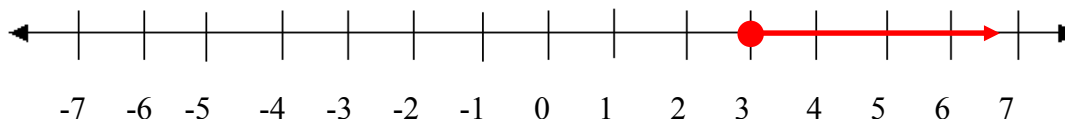
15. $x > 3$
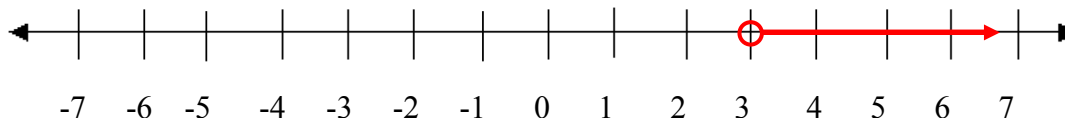
17. $\{x | x < -7.5\}$

19. $\{x | x > 3\}$

21. $\{x | x \leq -15\}$

23. $\left\{x \middle| x \leq -\frac{4}{3}\right\}$

25. $\{x | -1 < x \leq 3\}$

27. $\left\{x \middle| -\frac{1}{5} < x < \frac{9}{5}\right\}$

29. The student needs at least an 89 on the fifth test to earn an A in the math class.

31. At most 640 employees can be trained.

33. At most $9\frac{7}{9}$ ounces of artificial flavors can be added to the real orange juice.

35. $68° \leq F \leq 95°$

Exercise Set 4.1

1. $10x^3 + 15x^2 - 20x$

3. $21x^3 - 35x^2 - 77x$

5. $-6x^4 + 9x^3 + 18x^2$

7. $-8x^4 + 20x^3 + 24x^2$

9. $15x^8 - 9x^7 - 6x^6$

11. $12x^3y - 8x^2y^2 + 20xy^3$

13. $-45x^3y^3 + 30x^4y^2 + 24x^4y^3$

15. $40x^4y^2 - 80x^3y^2 - 56x^3y^3 - 96x^4y^3$

17. $15x^2 + 22x + 8$

19. $15x^2 + 29x - 14$

21. $35x^2 - 87x + 22$

23. $42x^2 - 53x + 15$

25. $55x^2 - 74x + 24$

27. $72x^2 - 15x - 42$

29. $15x^2 + 30x - 120$

31. $6x^4 - 6x^2 - 36$

33. $72x^4 - 206x^2 + 140$

Exercise Set 4.2

1. $6x(2x^2 + x - 3)$ or $6x(2x + 3)(x - 1)$

3. $4x^3(5x^2 - 4x - 3)$

5. $11x^2(3x^4 + 5x^2 - 4)$

7. $9x^2(7x^3 - 2x^2 + 6)$

9. $y^2(40y^4 - 49y^2 - 35)$

11. $(x + 2)(x + 3)$

13. $(x + 8)(x + 1)$

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

17. does not factor

19. $(x - 3)(x - 4)$

21. $(x - 5)(x + 4)$

23. $(x + 7)(x - 3)$

25. $(x - 4)(x - 1)$

27. $(x + 9)(x + 2)$

29. $(x - 8)(x + 3)$

31. $(x + 6)(x - 5)$

33. does not factor

35. $(x + 8)(x + 8)$

37. $(2x - 1)(x + 3)$

39. $(3x - 1)(x - 5)$

41. does not factor

43. $(2x + 3)(x - 1)$

45. $(5x + 2)(x - 3)$

47. $(3x - 1)(2x + 1)$

49. $(4x + 3)(x - 2)$

51. $(2x - 5)(2x + 3)$

53. $5x(x + 3)(x + 1)$

55. $3x^2(x - 5)(x + 2)$

57. $4x^3(x - 4)(x - 2)$

59. $20x^3(x + 4)(x + 1)$

61. $x = 7,9$

63. $x = -\frac{3}{2}, \frac{1}{3}$

65. $x = 1,4$

67. $x = -7,3$

69. $x = -1,6$

71. $x = -3,4$

73. $x = 3,6$

75. $x = 0,1,2$

77. $x = -4,0,5$

79. $x = -\frac{1}{3}, 2$

81. $x = -\frac{3}{2}, 1$

83. The numbers are 5 and 6.

85. The numbers are 3 and 5.

Exercise Set 4.3

1. $x = -1, \frac{5}{3}$

3. $x = \frac{-3 \pm \sqrt{29}}{10}$

5. $x = \frac{7 \pm \sqrt{13}}{6}$

7. $x = \frac{3 \pm \sqrt{5}}{2}$

9. $x = \frac{1 \pm \sqrt{85}}{6}$

11. $x = \frac{1 \pm 2\sqrt{7}}{3}$

13. $x = -\frac{1}{6}, \frac{1}{2}$

15. $x = \frac{-1 \pm \sqrt{5}}{4}$

17. $x = -\frac{2}{3}, 2$

19. $x = \frac{7 \pm \sqrt{37}}{4}$

21. $x = 1 \pm \sqrt{6}$

Exercise Set 5.1

1. $(2,5)$
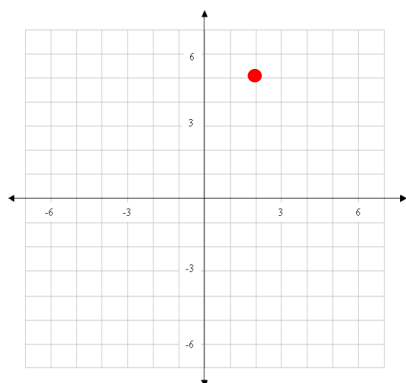
3. $(-3, -5)$
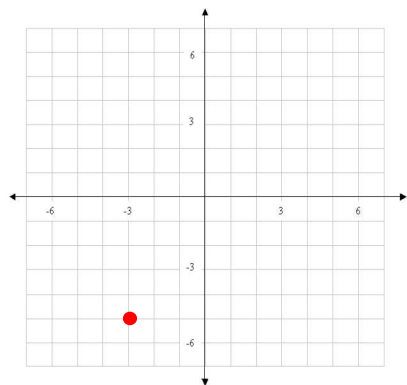
5. $(3, -1)$
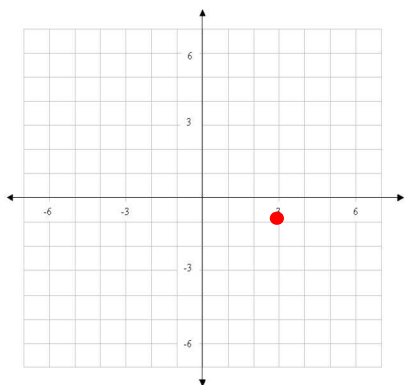
7. $(0, 0)$
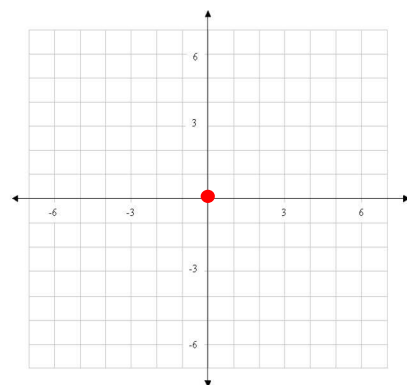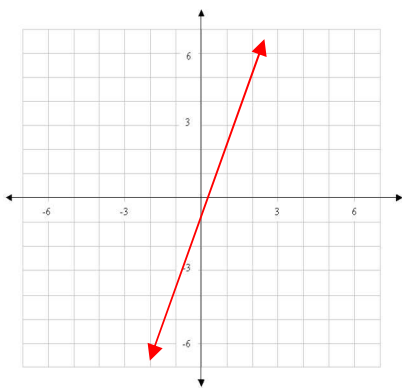
9. (2.5,3.5)
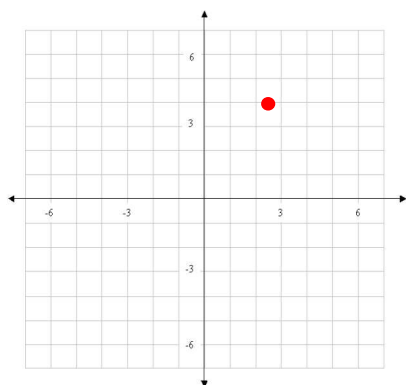
11. $\left(\frac{1}{2}, \frac{3}{4}\right)$
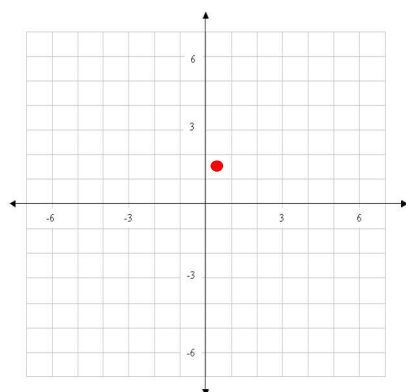
13.   a. $f(2) = 1$
       b. $f(10) = 25$
       c. $f(-3) = -14$
       d. $f(0) = -5$

15.   a. $g(2) = 14$
       b. $g(-3) = -6$
       c. $g(0) = 0$
       d. $g\left(\frac{1}{5}\right) = 1\frac{1}{25}$

17.   a. $f(3) = 35$
       b. $f(-2) = 20$
       c. $f(0) = 8$
       d. $f(-5) = 83$

19.   a. $h(7) = 4$
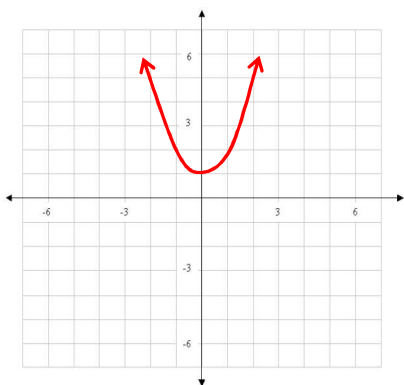   b. $h(-5) = 2$
       c. $h(0) = 3$
       d. $h(91) = 10$

21. $f(x) = 3x - 1$

23. $f(x) = -2x + 1$
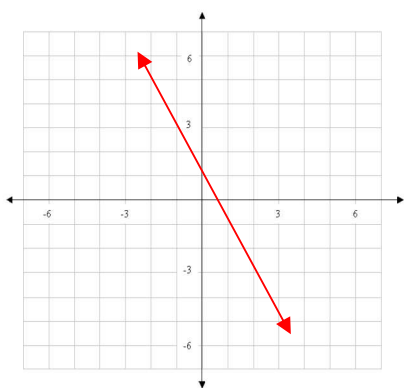
25. $g(x) = x^2 + 1$

27. Yes, the graph is the graph of a function.

29. Yes, the graph is the graph of a function.

31. No, the graph is not the graph of a function.

33. No, the graph is not the graph of a function.

35. Yes, the graph is the graph of a function.

37. a. 7725 kilograms
    b. 193,125 kilograms

39. a. $48,550
     b. The function underestimates the price by $3450.

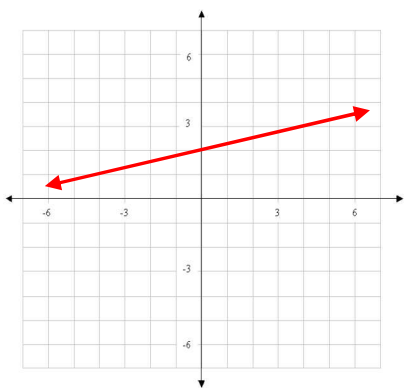Exercise Set 5.2

1. Yes, $(3,5)$ is a solution to $y = 2x - 1$.

3. No, $(5, -4)$ is not a solution to $y = -2x + 3$.

5. Yes, $(-2,3)$ is a solution to $y = 2x + 7$.

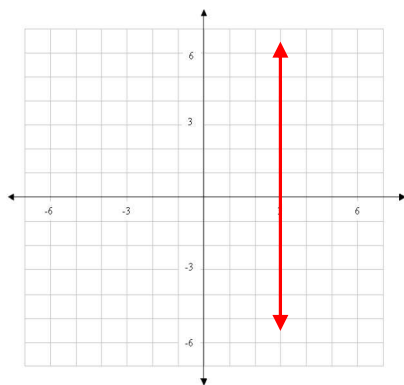7. No, $(-2,5)$ is not a solution to $3x + 2y = 9$.
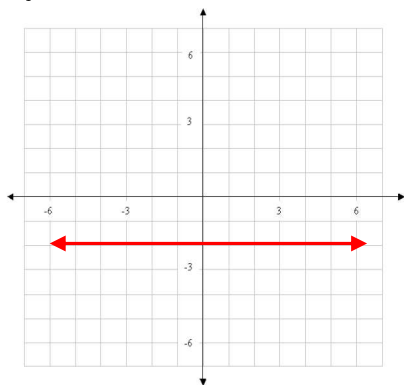
9. $y = -2x + 3$
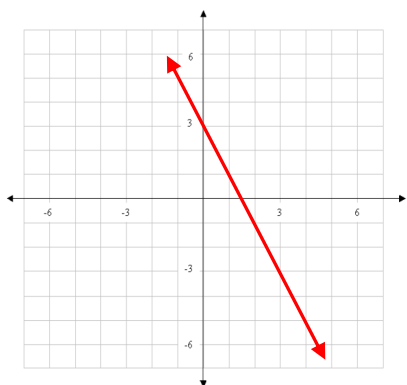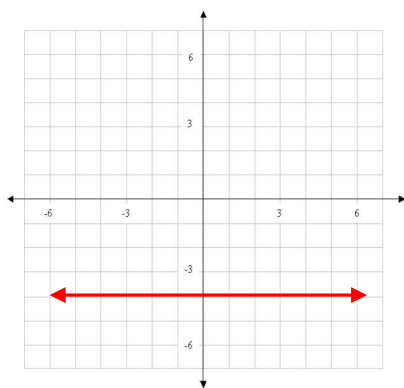
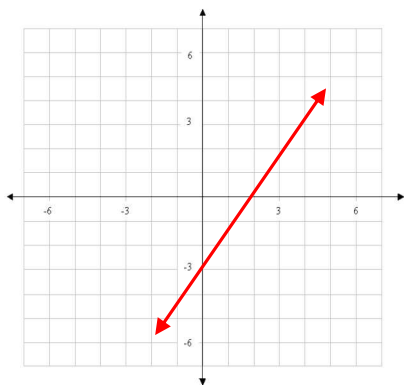11. $y = -\frac{1}{3}x + 2$
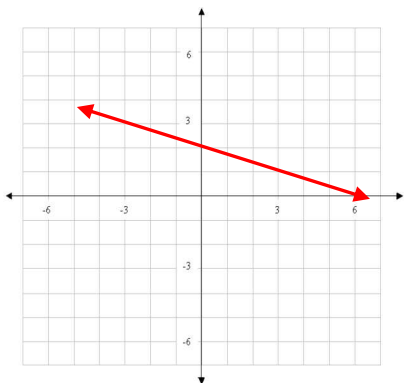
13. $y = \frac{1}{4}x + 2$

15. $x = 3$
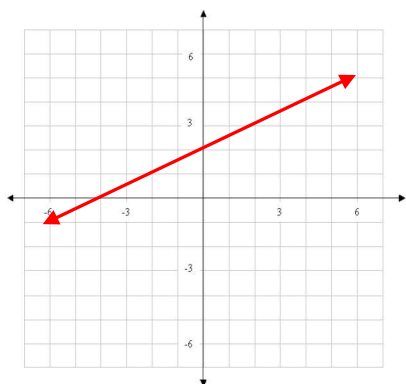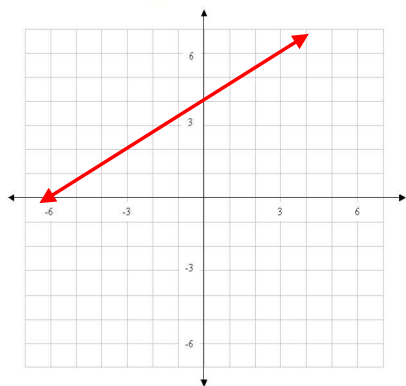
17. $y = -2$

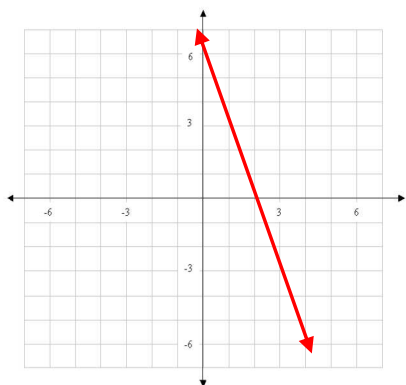**19.** $y = -4$

21. $3x - 2y = 6$

23. $2x - 4y = -8$
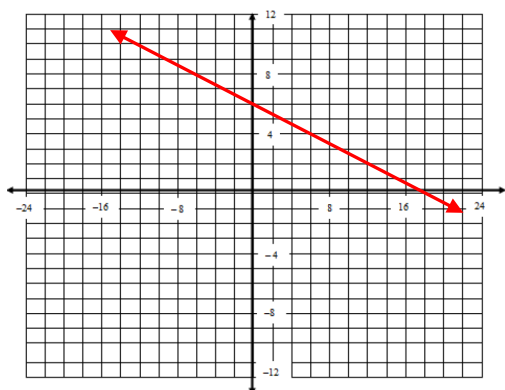
25. $-2x + 3y = 12$

27. $y = -3x + 6$

29. $y = -\frac{1}{3}x + 6$
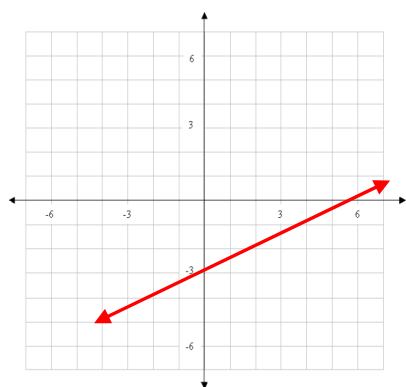

31. $m = 4$

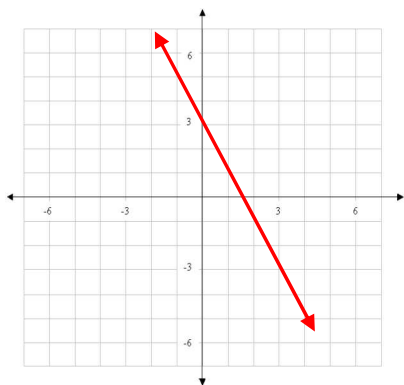33. $m = -3$

35. $m = -\frac{1}{2}$

37. $m = 0$

39. undefined slope

41. $y = \frac{1}{2}x - 3$

43. $y = -2x + 3$

45. $y = -\dfrac{1}{3}x + 2$
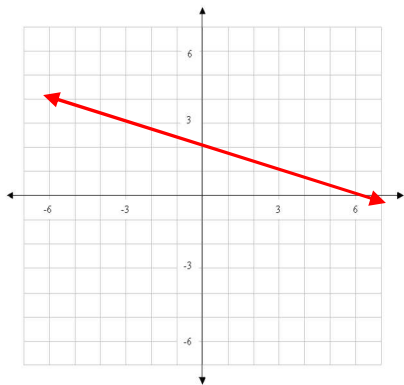
47. $y = 3x - 2$
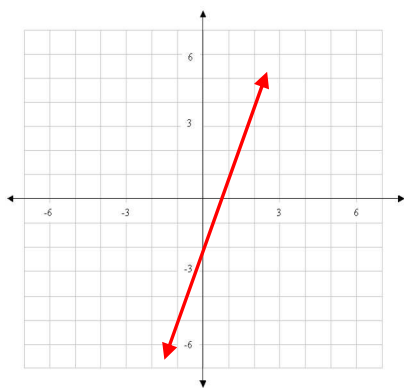
49. $3x - 6y = 12$
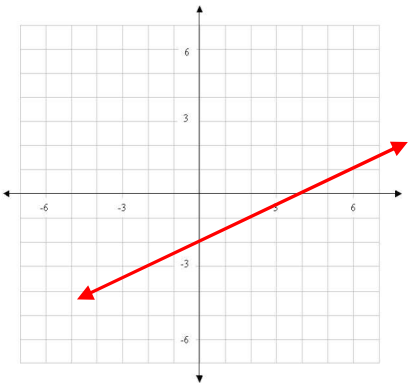
51. $2x + 3y = 3$
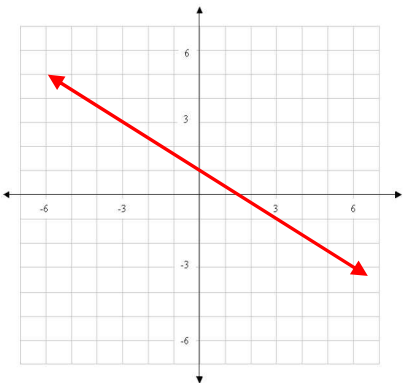
Exercise Set 5.3

1. Yes

3. No

5. $(3,1)$

7. No solution

9. $(1,5)$

11. $(-1,1)$

13. $(2,3)$

15. $(-2,6)$

17. $(-5,-2)$

19. $(3,1)$

21. $(-3,2)$

23. $(1,4)$

25. $(2,-1)$

27. $(-1,-2)$

29. $(7,-3)$

31. $(-3,2)$

33. There are 52 grams of sugar in the cola and 45 grams of sugar in the root beer.

35. 21 motorcycles and 17 cars had all tires replaced.

37. The 4% bond is for $120,000 and the 2% bond is for $30,000.

39. The hot dog costs 1.75 euro and the beer costs 1.50 euro.

Exercise Set 5.4

1. $f(x) = x^2 + 4x + 3$
a. up
b. $(-2,-1)$
c. $(-3,0)$ and $(-1,0)$
d. $(0,3)$
e.
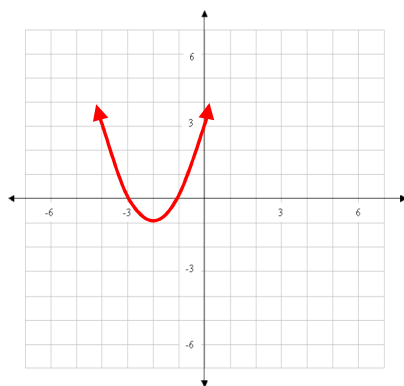
3. $f(x) = x^2 + 2x - 3$

a. up
b. $(-1, -4)$
c. $(-3, 0)$ and $(1, 0)$
d. $(0, -3)$
e.
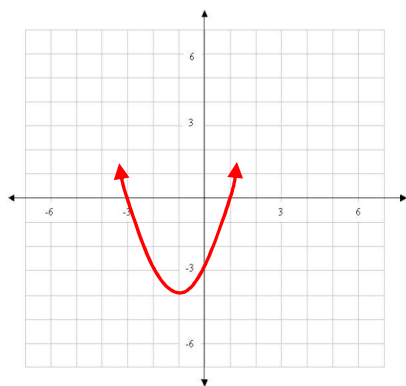
5. $f(x) = -x^2 + 4x - 3$

a. down
b. $(2, 1)$
c. $(1, 0)$ and $(3, 0)$
d. $(0, -3)$
e.
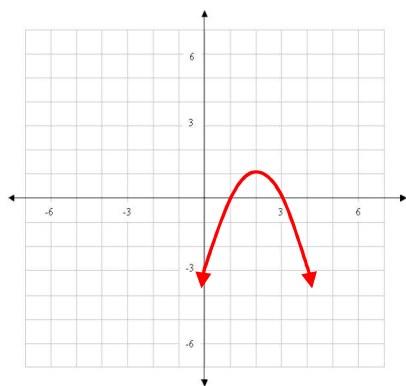
7. $f(x) = 2x^2 - 8x + 6$
a. up
b. $(2, -2)$
c. $(1,0)$ and $(3,0)$
d. $(0,6)$
e.
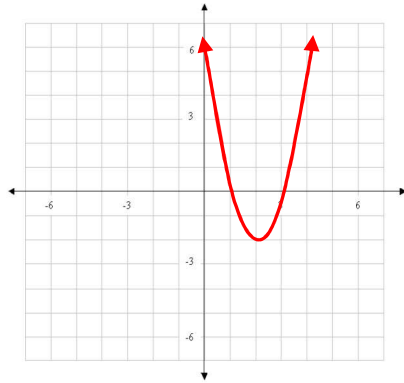
9. $f(x) = -2x^2 + 4x + 6$
a. down
b. $(1,8)$
c. $(-1,0)$ and $(3,0)$
d. $(0,6)$
e.
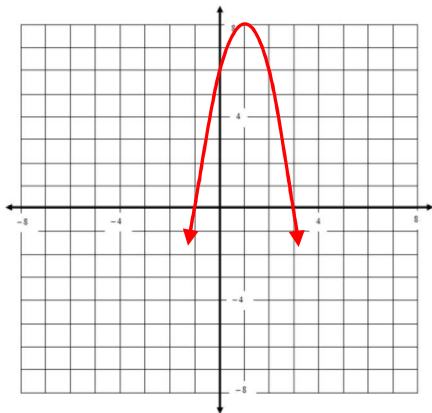
11. The minimum of -34 is found at x = - 3.

13. The maximum of 42 is found at x = - 2.

15. The minimum of -140 is found at x = 4.

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17. The maximum of 82,500 is found at x = 25.

19. According to the function, the maximum profit is $15,988,000, which occurs when 20,000 security systems are installed.

21. According to the function, the maximum profit is $34,500, which occurs when 300 boots are produced and sold.

23. According to the function, the maximum height is 44.1 meters, which occurs 3 seconds after the object is launched. The time t must be more than 0 seconds because before that the object has not been launched. The time can be no more than 6 seconds because the object hits the ground 6 seconds after being launched.

Exercise Set 5.5

1. $f(x) = 3^x$
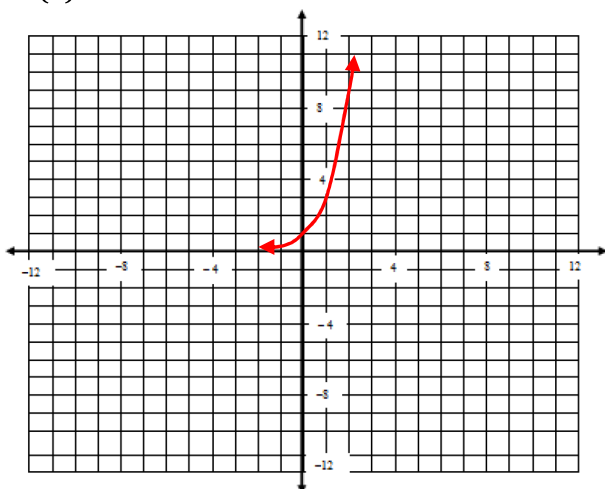
3. $f(x) = \left(\frac{1}{3}\right)^x$
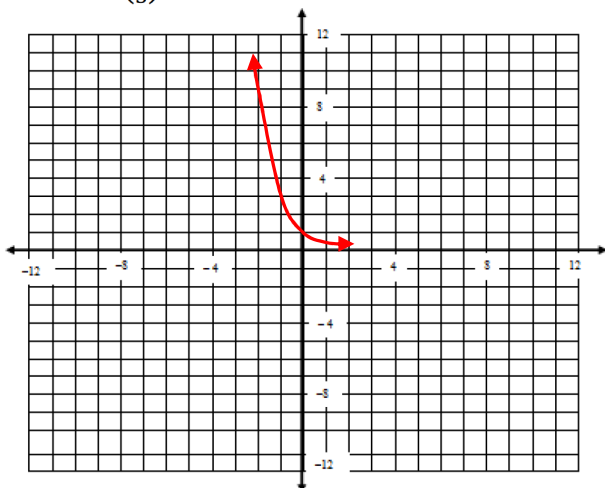
5. $f(x) = 2^{x+1}$
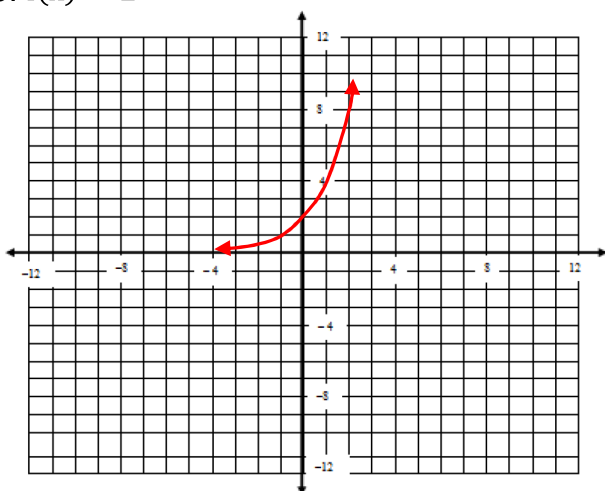
7. $f(x) = 3^{x-3}$
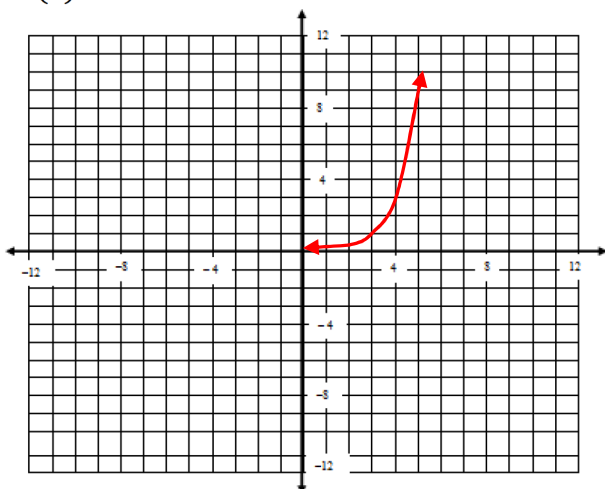
9. $f(x) = 2^x - 5$
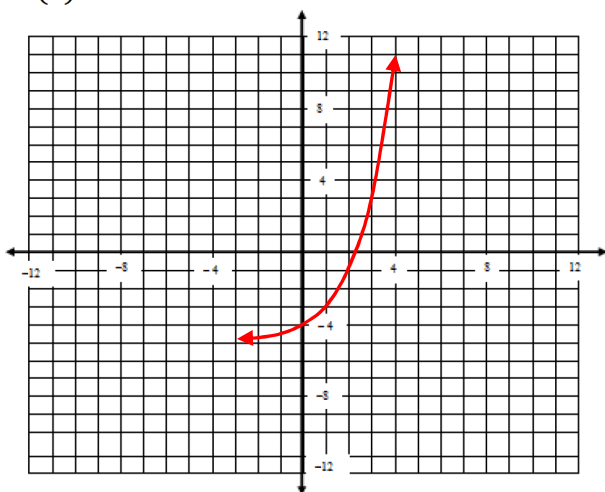
11. $f(x) = 3^x - 4$
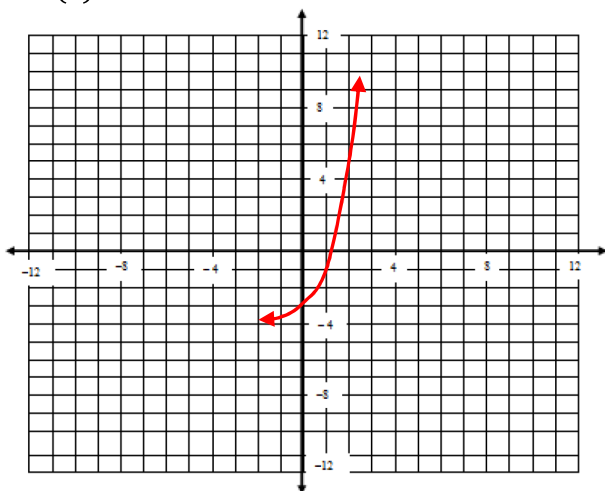
13. $f(x) = 3^{-x}$
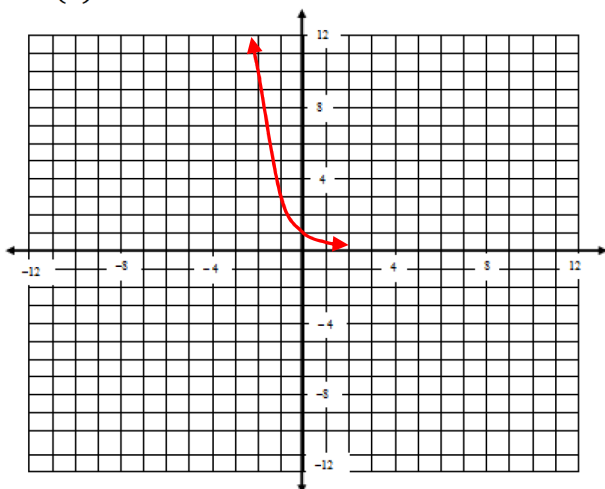
15. According to the formula, 5,000,000 people had malaria in 1960 and 10,000,000 people had malaria in 1985. So, the doubling time is 25 years.

17. According to the formula, there will be 14.9 grams of carbon-14 10,000 years after the organism dies.

Exercise Set 5.6

1. $2 = \log_{10} 100$

3. $3 = \log_2 8$

5. $-2 = \log_3 \dfrac{1}{9}$

7. $16 = 4^2$

9. $1 = 5^0$

11. $\dfrac{1}{49} = 7^{-2}$

13. $y = \log_2 x$
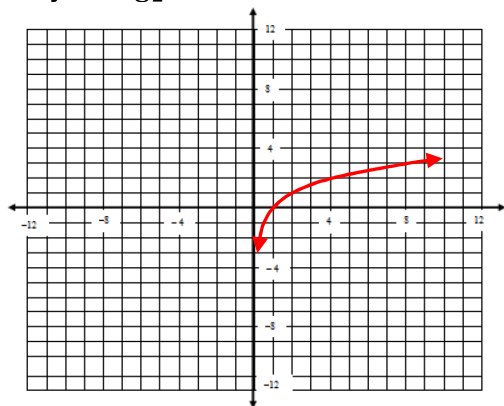
15. $y = \log_2(x + 3)$
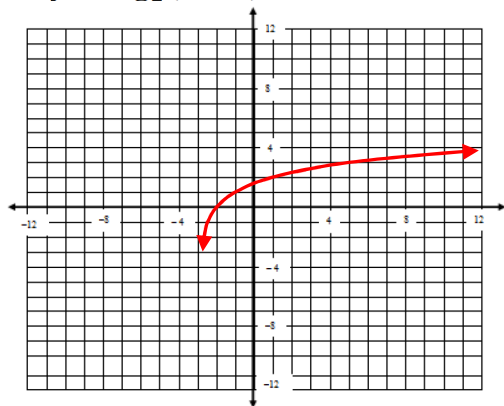
17. $y = \log_{\frac{1}{3}} x$
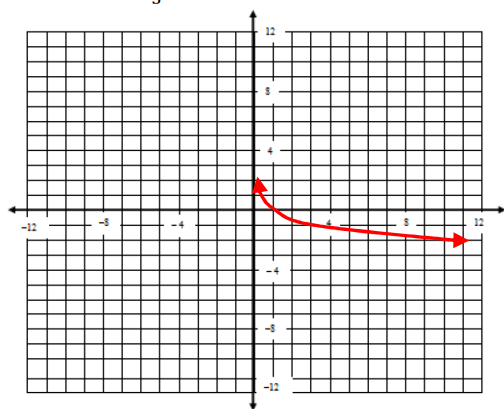
19. $y = \log_3(x + 1)$
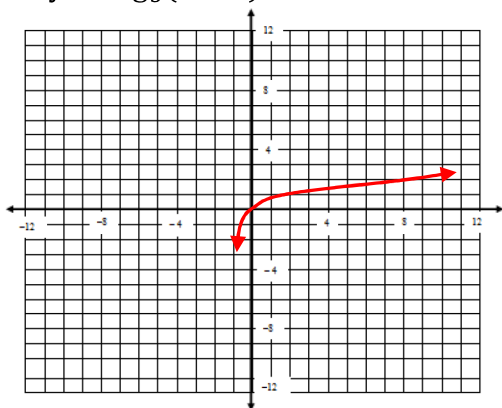
21. 4602 people will hear about the product after $40,000 is spent on advertising. 6176 people will hear about the product after $1,500,000 is spent on advertising. It does not appear that the extra advertising dollars will be well spent.

23. The growth rate is 9.9%, which is very high for inflation.

Exercise Set 6.1

1. $2080

3. $225,000

5. $162

7. $580.83

9. $184.93

11. $16,695.21

13. $25,920

15. $15,750

17. $14,978

19. 6.5%

21. 7.6%

23. $12,791

25. $8733

27. $69.35

29. $25,813.70

31. 3.7%

33. $48,781

Exercise Set 6.2
For future value problems, round to the nearest dollar.
1. $26,044

3. $557,265

5. $333,184

7. $25,871

9. $295,967

11. $207,484 ; If this were simple interest instead of annually compounded interest the future value would be $136,800. The future value for annually compounded interest is more than simple interest because the interest that is earned and applied each year grows for the rest of the investment time. For simple interest the interest is applied once at the end of the investment time based on the original principal only.

13. $125,225

15. $73,288

17. $1,076,891

19. $50,186

21. $8,723

23. $63,510

25. $63

For present value problems, round-up to the nearest dollar.

27. $24,263

29. $60,570

31. $35,801

33. $52,237

35. $11,655

37. $12,690

39. $349,460

41. a. $203,849
    b. $552,967
    c. $91,961 at 7% ; $452,469 at 3%
    d. The twenty-five year old could invest some money every month.

43. $39,445.74

Exercise Set 6.3

1. $158,853 ; $68,853

3. $1,489,153 ; $1,201,153

5. a. $603,518 ; $387,518
   b. $349,312 ; $133,312
   c. By starting to save for retirement earlier, the young person earns $254,206
                                        extra in interest for the
same amount of money put in.

7. $662 ; $721,960

9. $3900 ; $298,000

11. a. $558
    b. $1453
    c. It is important for the couple to start early because they pay less.
    d. $363 ; $752

13. $376,249 ; $229,249

15. $403,866 ; deposits account for $16,154,640; interest accounts for $3,845,360

Exercise Set 6.4

For the following questions, round to the nearest dollar.

1. a. $13,750
   b. $261,250
   c. $3918.75
   d. $1443
   e. $258,230

3. a. $174,000
   b. $406,000
   c. $8120
   d. $3054
   e. $143,720

5. a. $1802 ; $339,970
   b. $2615 ; $70,050
   c. If the couple can afford the down payment and the monthly payments, the
                                                    second option will be much
better because it saves them $269,920 in   interest.

7. a. $1277 ; $387,960
   b. $1471 ; $84,780
   c. If the bachelor can afford the down payment and the monthly payments,   the
second option will be much better because it saves the bachelor $303,180 in
interest.

9. $431 ; $17,720

11. $872 ; $1392

13. $776 ; $33,120

Exercise Set 7.1

1. 24

3. 1

5. 182

7. 639,200

9. 28

11. $\approx 8.04531 \times 10^{13}$

13. 67,600,000 ; Two possible license plates are AA 12345 and BZ 73912 .

15. 45 ; Two possible breakfast options are coffee/omelet/booth and juice/pancakes/counter .

17. $_{10}P_2 = 90$

19. $_{20}P_4 = 116,280$

21. $_{18}C_4 = 3060$

23. $_{25}C_6 = 177,100$

25. $_{10}C_2 \cdot {}_8C_5 = 2520$

27. 36

29. 32

31. $_{15}P_4 = 32,760$

33. $_{30}P_4 = 657,720$

35. $_{200}P_3 = 7,880,400$

37. $_{150}C_3 = 551,300$

39. $_8C_3 \cdot {}_{15}C_5 = 168,168$

41. 96

43. $20 \cdot 20 \cdot 20 = 8000$ ways if the flavors can be repeated. $_{20}P_3 = 6840$ ways if the flavors must be different.

45. $_{100}C_{15} \approx 2.53338 \times 10^{17}$

47. $_{80}P_2 = 6320$

49. $_{15}C_2 \cdot {}_9C_3 = 8820$

Exercise Set 7.2

1. $\frac{3}{6}$ or .5

3. $\frac{2}{3}$ or .667

5. $\frac{1}{3}$ or .333

7. $\frac{0}{6}$ or 0

9. $\frac{3}{8}$ or .375

11. $\frac{1}{2}$ or .5

13. $\frac{1}{8}$ or .125

15. $\frac{7}{8}$ or .875

17. $\frac{0}{8}$ or 0

19. $\frac{3}{8}$ or .375

21. $\frac{11}{16}$ or .6875

23. $\frac{1}{4}$ or .25

25. $\frac{5}{16}$ or .3125

27. $\frac{11}{16}$ or .6875

29. $\frac{0}{16}$ or 0

31. $\frac{3}{10}$ or .3

33. $\frac{3}{10}$ or .3

35. $\frac{7}{15}$ or .467

37. $\frac{3}{5}$ or .6

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39. $\frac{1}{5}$ or .2

41. $\frac{1}{2}$ or .5

43. $\frac{7}{12}$ or .583

45. $\frac{5}{18}$ or .278

47. $\frac{0}{36}$ or 0

49. $\frac{11}{20}$ or .55

51. $\frac{9}{20}$ or .45

53. $\frac{1}{6}$ or .167

55. $\frac{1}{5}$ or .2

57. $\frac{19}{50}$ or .38

59. $\frac{31}{100}$ or .31

61. $\frac{7}{50}$ or .14

Exercise Set 7.3

1. .9999 or 99.99%

3. $\frac{127}{128}$ or .992

5. $\frac{5}{8}$ or .625

7. $\frac{7}{16}$ or .4375

9. $\frac{7}{10}$ or .7

11. $\frac{1}{2}$ or .5

13. $\frac{2}{5}$ or .4

15. $\frac{1}{2}$ or .5

17. $\frac{3}{5}$ or .6

19. $\frac{1}{3}$ or .333

21. $\frac{3}{5}$ or .6

23. $\frac{2}{5}$ or .4

25. $\frac{1}{3}$ or .333

27. P(chocolate or walnut) $= \frac{18}{25}$ or .72   P(neither chocolate nor walnut) $= \frac{7}{25}$ or .28

29. $\frac{7}{15}$ or .467

31. $\frac{4}{5}$ or .8

33. $\frac{11}{20}$ or .55

35. $\frac{43}{60}$ or .717

37. $\frac{3}{4}$ or .75

39. $\frac{59}{100}$ or .59

41. $\frac{67}{100}$ or .67

43. $\frac{61}{100}$ or .61

45. $\frac{47}{100}$ or .47

47. $\frac{27}{50}$ or .54

49. $\frac{69}{100}$ or .69

Exercise Set 7.4

1. $\frac{1}{4}$ or .25

3. $\frac{1}{3}$ or .333

5. $\frac{1}{3}$ or .333

7. $\frac{1}{8}$ or .125

9. $\frac{1}{9}$ or .111

11. $\frac{8}{27}$ or .296

13. $\frac{4}{25}$ or .16

15. $\frac{2}{15}$ or .133

17. $\frac{9}{100}$ or .09

19. $\frac{1}{30}$ or .0333

21. $\frac{27}{1000}$ or .027

23. $\frac{1}{120}$ or .00833

25. $\frac{1}{4}$ or .25

27. $\frac{1}{3}$ or .333

29. a. 0.027
     b. 0.7
     c. 0.343
     d. 0.657

31. $\frac{49}{225}$ or .217

33. $\frac{1}{5}$ or .2

35. $\frac{1}{25}$ or .04

37. $\frac{1}{70}$ or .0143

39. $\frac{343}{3375}$ or .102

41. $\frac{1}{13}$ or .0769

43. $\frac{1}{7}$ or .143

45. $\frac{1}{5}$ or .2

47. $\frac{3}{7}$ or .429

49. $\frac{1}{5}$ or .2

51. $\frac{4}{9}$ or .444

53. $\frac{1}{6}$ or .167

55. $\frac{11}{20}$ or .55

57. $\frac{3}{8}$ or .375

59. $\frac{21}{100}$ or .21

61. $\frac{1}{10}$ or .1

63. $\frac{10}{21}$ or .476

65. $\frac{5}{21}$ or .238

67. $\frac{13}{20}$ or .65

69. $\frac{7}{18}$ or .389

Exercise Set 8.1

1. quantitative discrete

3. quantitative continuous

5. qualitative

7.

Number of Devices	Number of families
1	1
2	3
3	6
4	5
5	7
6	5
7	0
8	3

26 families had at least 3 electronic devices in their home.

9.

Number of Sunglasses	Number of Students
0	8
1	7
2	3
3	2

8 students did not lose any sunglasses over the last year.

11.
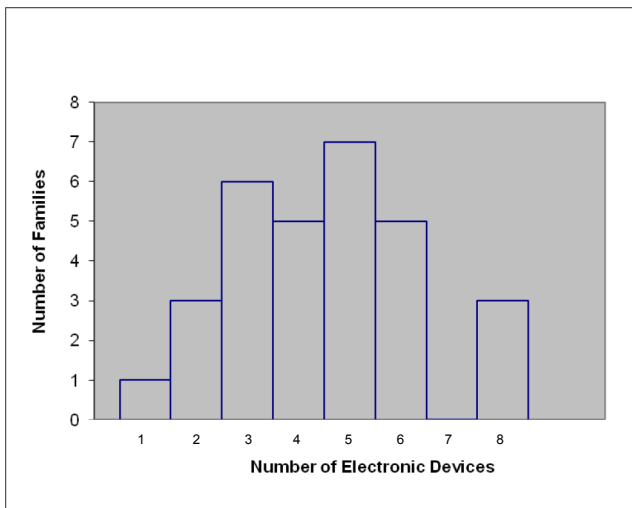
10 families had at most 3 electronic devices in their home.

13.
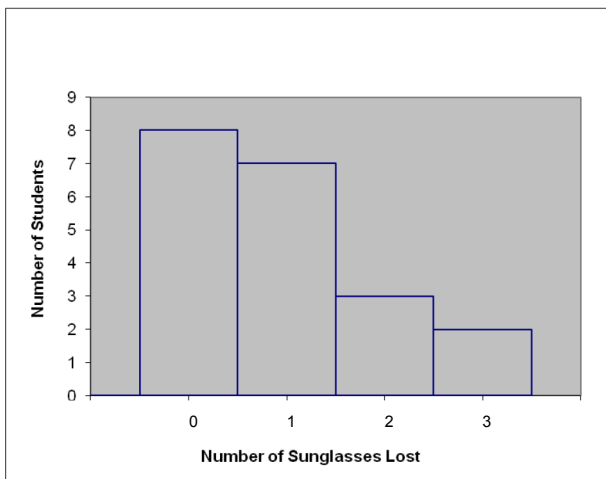
12 students lost at least 1 pair of sunglasses over the last year?

15.
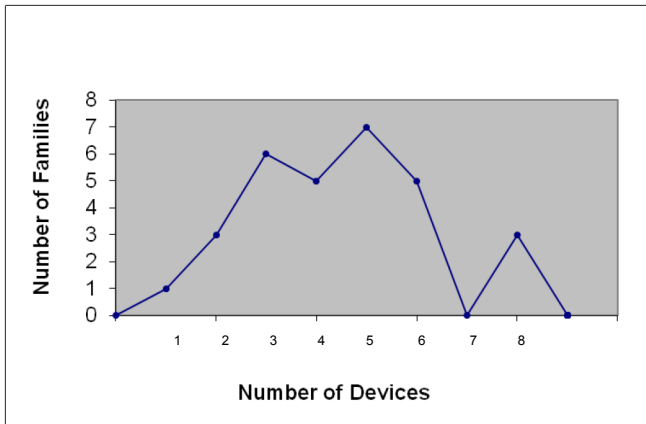
14 families had between 2 and 4 electronic devices inclusive in their home.

17.
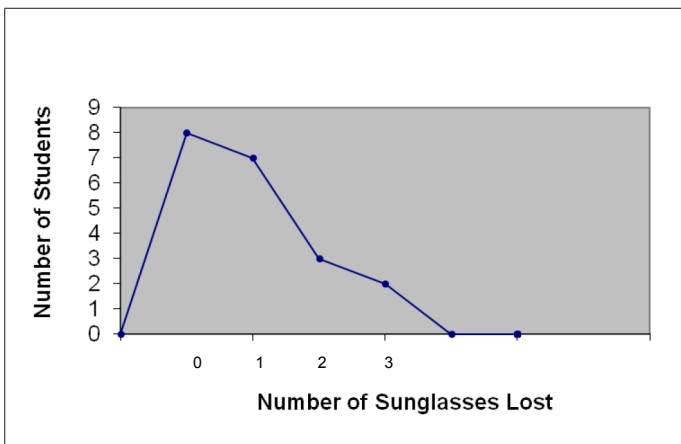
All 20 students lost less than 4 pairs of sunglasses over the last year.

19. Frequency distributions, frequency polygons, and histograms all group the raw data into different classes and display the frequency of the different classes. Frequency polygons and histograms display the data as pictures whereas frequency polygons use a table with numbers to show the size of the classes. Histograms use the height of bars to represent the size of the different classes.

Exercise Set 8.2

1. 87 is the mean grade.

3. 90 is the median grade.

5. A score of 80 is the mean grade.

7. A score of 75 is the median grade.

9. Answers will vary. The mean takes the size of all the data values into account in its calculation. The mode is the most frequently occurring value. The median is the "middle" value for all of the values. The midrange is the "middle" value for the lowest and highest values only.

11. 0 absences

13. 3 absences

15. 4.5 is the mode of the scores.

17. 4.15 is the midrange of the scores.

19. 4.4 children

21. 4.5 children

23. 11.4 cartoons of eggs

25. 11.5 cartoons of eggs

27. 2.2 cups of coffee

29. 2 cups of coffee

31. Answers will vary. The mean takes the size of all the data values into account in its calculation. The mode is the most frequently occurring value. The median is the "middle" value for all of the values. The midrange is the "middle" value for the lowest and highest values only.

33. 0 lost pairs of sunglasses

35. 1.5 lost pairs of sunglasses

37. 4 false claims

39. 4.5 false claims

41. 6.4 lost keys

43. 6 lost keys

Exercise Set 8.3

1. The range for the grades is 30.

3. The range for the grades is 35.

5. Set 1: The mean score is 80.
   Set 2: The mean score is 80.

7. Set 1: The standard deviation of the test scores is 20.
   Set 2: The standard deviation of the test scores is 14.6.

9. The standard deviations show that the data for set 1 is more spread out than the data for set 2 even though the means and ranges are the same..

11. 2.3 absences

13. The standard deviation of the scores is 0.44 .

15. 1.8 lost children

17. 16 eggs

19. 1.5 cups of coffee

21. 0.999 lost pairs of sunglasses

23. 1.75 false claims

25. 1.5 lost keys

Exercise Set 8.4

1. It means that 95% of men are less than 74 inches tall.

3. It means that 92% of women are less than 69 inches tall.

5. It means that 98% of the scores on the test are less than 52.

7. 95%

9. 16%

11. 2.5%

13. 68%

15. 2.5%

17. 16%

19. 2

21. -1.5

23. 1.83

25. 0

27. -0.33

29. 0.9821 or 98.21%

31. 0.0901 or 9.01%

33. 0.3936 or 39.36%

35. 0.9838 or 98.38%

37. 0.6141 or 61.41%

39. 0.8943 or 89.43%

41. 0.5346 or 53.46%

43. 0.9452 or 94.52%

45. 0.9641 or 96.41%

47. 0.0294 or 2.94%

49. 0.2877 or 28.77%

51. 0.4973 or 49.73%

53. 0.4246 or 42.46%

55. 0.903 or 90.3%

57. 0.1151 or 11.51%

59. 0.9452 or 94.52%

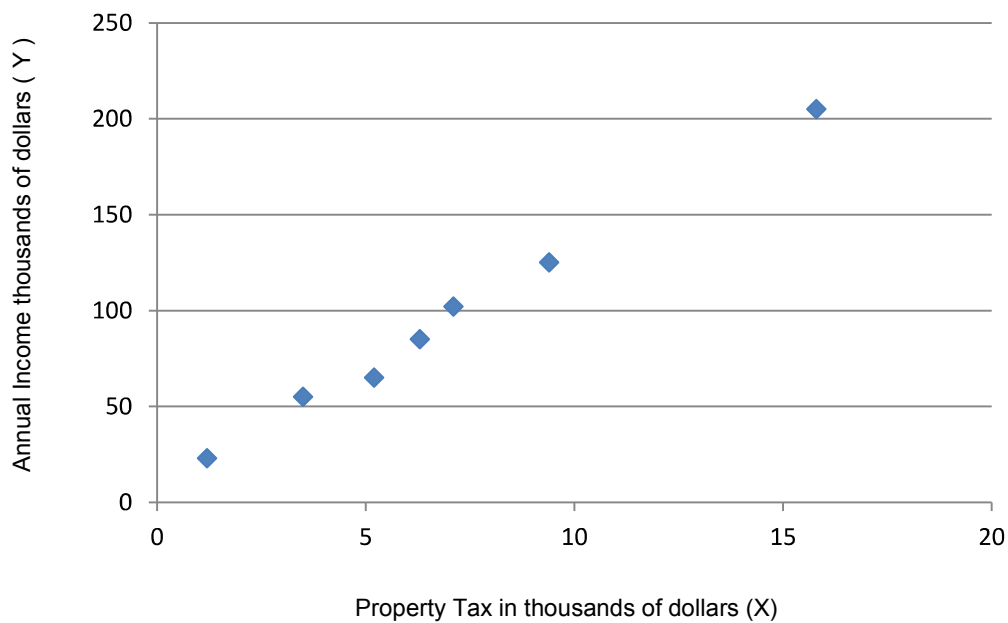61. 0.6962 or 69.62%

63. 0.0012 or 0.12%

65. 0.0012 or 0.12%
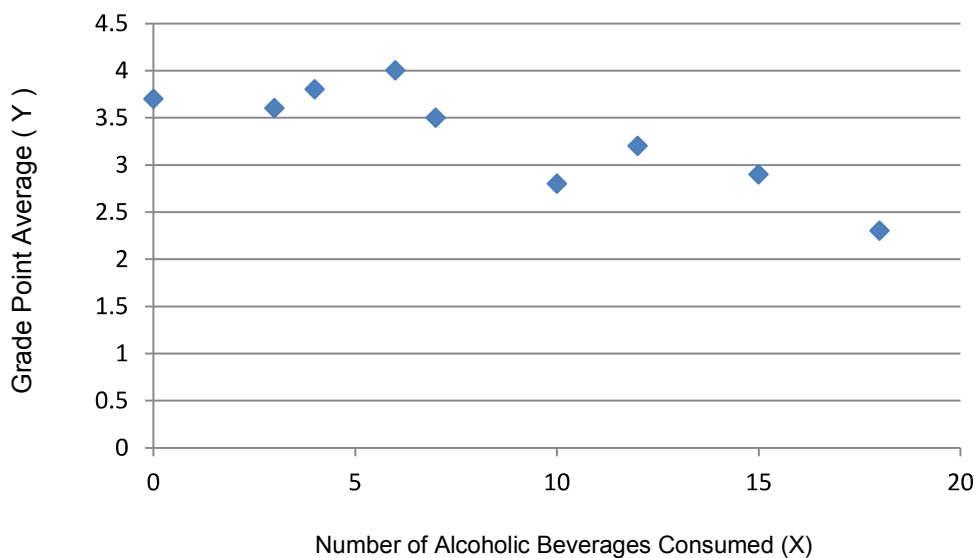
67. 0.3167 or 31.67%

Exercise Set 8.5

1.

There is a positive linear correlation between property tax and annual income.

3.

There is a negative linear correlation between number of alcoholic beverages consumed and grade point average.

5.
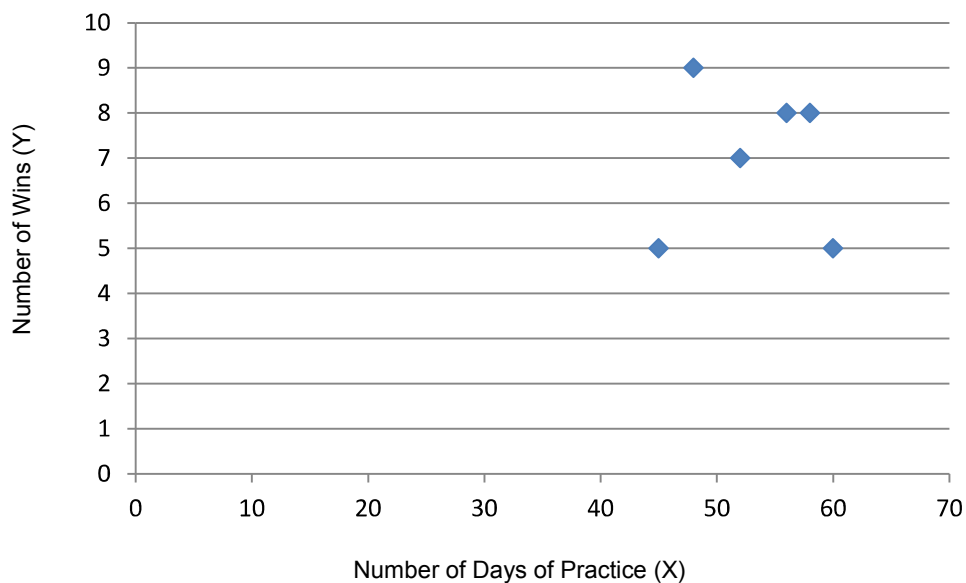
There is no linear correlation between number of days of practice and number of wins.

7. D

9. E

11. A

13. r = -0.96 ; strong negative correlation ; supported by the scatter plot

15. r = 0.69 ; moderate positive linear correlation ; supported by the scatter plot

17. r = 0.915 ; strong positive linear correlation ; support by the scatter plot

Math 103 Formula Sheet

Financial Management

Simple Interest: $\quad Int = Prt$

Future Value for Simple Interest: $\quad FV = P(1 + rt)$

Future Value for Compound Interest: $\quad FV = P\left(1 + \dfrac{r}{n}\right)^{nt}$

Present Value for Compound Interest: $\quad P = \dfrac{FV}{\left(1 + \frac{r}{n}\right)^{nt}}$

Future Value for continuous compounding: $\quad FV = Pe^{r \cdot t}$

Effective Annual Yield: $\quad EAY = \left(1 + \dfrac{r}{n}\right)^{n} - 1$

Future Value of an Annuity (Pmt is the amount of each deposit): $\quad FV = \dfrac{Pmt\left[\left(1 + \frac{r}{n}\right)^{nt} - 1\right]}{\left(\frac{r}{n}\right)}$

Periodic deposits for an Annuity (FV is the future value of the annuity): $\quad Pmt = \dfrac{FV\left(\frac{r}{n}\right)}{\left[\left(1 + \frac{r}{n}\right)^{nt} - 1\right]}$

Periodic Mortgage Payments (B is the amount of mortgage): $\quad Pmt = \dfrac{B\left(\frac{r}{n}\right)}{\left[1 - \left(1 + \frac{r}{n}\right)^{-nt}\right]}$

Probability and Counting Rules

Permutation rule: $\quad {}_n P_k = \dfrac{n!}{(n-k)!}$

Combination rule: $\quad {}_n C_k = \dfrac{n!}{(n-k)!\,k!}$

$P(\overline{E}) = 1 - P(E)$

$P(E) = 1 - P(\overline{E})$

$P(A \text{ or } B) = P(A) + P(B)$

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$P(A \text{ and } B) = P(A) \cdot P(B)$

$P(B \text{ given } A) = \dfrac{\text{number of common outcomes for B and A}}{\text{number of outcomes within A}}$

Statistics

Mean for individual data: $\quad \bar{x} = \dfrac{\sum x}{n}$

Mean for grouped data: $\quad \bar{x} = \dfrac{\sum f \cdot x_m}{n}$

Standard Deviation: $\quad s = \sqrt{\dfrac{\sum(x - \bar{x})^2}{n-1}}$

Z-score: $\quad z = \dfrac{x - \bar{x}}{s}$

$\bar{x}$ = mean   x = data values $\sum$ = add all the values   f = frequency x_m = class or class midpoint   s = standard deviation