3.2

Exercise 3.2

In Problems 1–8, mentally solve each equation.

1. $3x = 21$ **2.** $3x = -24$ **3.** $5x + 15 = 0$ **4.** $3x + 18 = 0$

5. $2x - 3 = 5$ **6.** $3x + 4 = -8$ **7.** $\frac{1}{3}x = \frac{5}{12}$ **8.** $\frac{2}{3}x = \frac{9}{2}$

In Problems 9–66, solve each equation algebraically.

9. $3x + 2 = x + 6$ **10.** $2x + 7 = 3x + 5$ **11.** $2t - 6 = 3 - t$

12. $5y + 6 = -18 - y$ **13.** $6 - x = 2x + 9$ **14.** $3 - 2x = 2 - x$

15. $3 + 2n = 5n + 7$ **16.** $3 - 2m = 3m + 1$ **17.** $2(3 + 2x) = 3(x - 4)$

18. $3(2 - x) = 2x - 1$ **19.** $8x - (2x + 1) = 3x - 10$ **20.** $5 - (2x - 1) = 10$

21. $\frac{3}{2}x + 2 = \frac{1}{2} - \frac{1}{2}x$ **22.** $\frac{1}{3}x = 2 - \frac{2}{3}x$ **23.** $\frac{1}{2}x - 5 = \frac{3}{4}x$

24. $1 - \frac{1}{2}x = 6$ **25.** $\frac{2}{3}p = \frac{1}{2}p + \frac{1}{3}$ **26.** $\frac{1}{2} - \frac{1}{3}p = \frac{4}{3}$

27. $0.9t = 0.4 + 0.1t$ **28.** $0.9t = 1 + t$ **29.** $\dfrac{x+1}{3} + \dfrac{x+2}{7} = 5$

30. $\dfrac{2x+1}{3} + 16 = 3x$ **31.** $\dfrac{2}{y} + \dfrac{4}{y} = 3$ **32.** $\dfrac{4}{y} - 5 = \dfrac{5}{2y}$

33. $\dfrac{1}{2} + \dfrac{2}{x} = \dfrac{3}{5}$ **34.** $\dfrac{3}{x} - \dfrac{1}{3} = \dfrac{1}{4}$ **35.** $x^2 = 9x$

36. $x^2 = -4x$ **37.** $x^2 - 25 = 0$ **38.** $x^2 - 9 = 0$

39. $z^2 + z - 12 = 0$ **40.** $v^2 + 7v + 12 = 0$ **41.** $2x^2 - 5x - 3 = 0$

42. $3x^2 + 5x + 2 = 0$ **43.** $3t^2 - 48 = 0$ **44.** $2y^2 - 50 = 0$

45. $x(x - 7) + 12 = 0$ **46.** $x(x + 1) = 12$ **47.** $4x^2 + 9 = 12x$

48. $25x^2 + 16 = 40x$ **49.** $6(p^2 - 1) = 5p$ **50.** $2(2u^2 - 4u) + 3 = 0$

51. $6x - 5 = \dfrac{6}{x}$ **52.** $x + \dfrac{12}{x} = 7$ **53.** $\dfrac{4(x-2)}{x-3} + \dfrac{3}{x} = \dfrac{-3}{x(x-3)}$

54. $\dfrac{5}{x+4} = 4 + \dfrac{3}{x-2}$ **55.** $(x + 7)(x - 1) = (x + 1)^2$ **56.** $(x + 2)(x - 3) = (x - 3)^2$

57. $x(2x - 3) = (2x + 1)(x - 4)$ **58.** $x(1 + 2x) = (2x - 1)(x - 2)$ **59.** $z(z^2 + 1) = 3 + z^3$

60. $w(4 - w^2) = 8 - w^3$ **61.** $\dfrac{x}{x-3} + 3 = \dfrac{3}{x-3}$ **62.** $\dfrac{3x}{x+2} = \dfrac{-6}{x+2} - 2$

63. $x^2 = 4x$ **64.** $x^3 = x^2$ **65.** $t^3 - 9t^2 = 0$

66. $4z^3 - 8z^2 = 0$

In Problems 67–70, use a calculator to solve each equation. Express the solution correct to two decimal places.

67. $3.2x + \dfrac{21.3}{65.871} = 19.23$ **68.** $6.2x - \dfrac{19.1}{83.72} = 0.195$

69. $14.72 - 21.58x = \dfrac{18}{2.11}x + 2.4$ **70.** $18.63x - \dfrac{21.2}{2.6} = \dfrac{14x}{2.32} - 20$

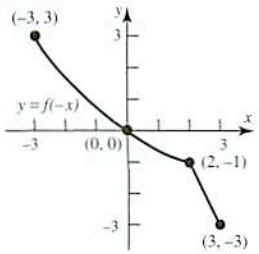
In Problems 71–76, solve each equation. The letters a, b, and c are constants.

71. $ax - b = c, \quad a \neq 0$ **72.** $1 - ax = b, \quad a \neq 0$ **73.** $\dfrac{x}{a} + \dfrac{x}{b} = c, \quad a \neq 0, b \neq 0, a \neq -b$

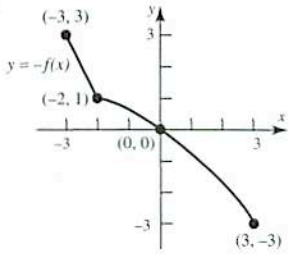
74. $\dfrac{a}{x} + \dfrac{b}{x} = c, \quad c \neq 0$ **75.** $\dfrac{1}{x-a} + \dfrac{1}{x+a} = \dfrac{2}{x-1}$ **76.** $\dfrac{b+c}{x+a} = \dfrac{b-c}{x-a}, \quad c \neq 0, a \neq 0$

67. $(f \circ g)(x) = \dfrac{1+x}{1-x}$; $(g \circ f)(x) = \dfrac{x-1}{x+1}$; $(f \circ f)(x) = x$; $(g \circ g)(x) = x$

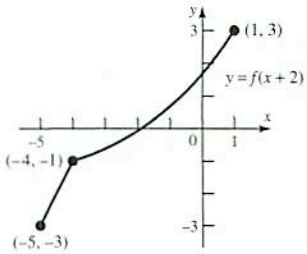
69. (a)



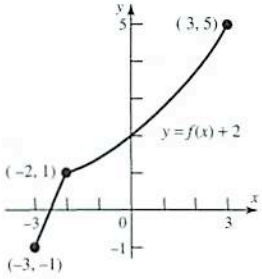
(b)



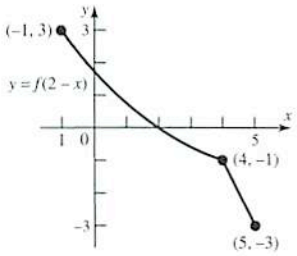
(c)



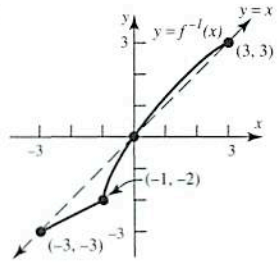
(d)



(e)



(f)



71. $T(h) = -0.0025h + 30$, $0 \le x \le 10{,}000$ **73.** $S(x) = kx(36 - x^2)^{3/2}$; Domain: $\{x \mid 0 < x < 6\}$

CHAPTER 3 *Exercise 3.1*

1. 0.42 **3.** 2.23 **5.** 1.25 **7.** $f(0) = -1$, $f(1) = 10$; 0.21 **9.** $f(-5) = -58$, $f(-4) = 2$; −4.04 **11.** $f(1.4) = -0.17536$, $f(1.5) = 1.40625$; 1.41
13. −3.41 **15.** −1.70 **17.** −0.28 **19.** 3.00 **21.** 4.50 **23.** 0.31, 12.30 **25.** 1.00, 23.00

Exercise 3.2

1. 7 **3.** −3 **5.** 4 **7.** $\frac{5}{4}$ **9.** 2 **11.** 3 **13.** −1 **15.** $-\frac{4}{3}$ **17.** −18 **19.** −3 **21.** $-\frac{3}{4}$ **23.** −20 **25.** 2 **27.** 0.5 **29.** $\frac{46}{5}$ **31.** 2 **33.** 20
35. {0, 9} **37.** {−5, 5} **39.** {−4, 3} **41.** $\{-\frac{1}{2}, 3\}$ **43.** {−4, 4} **45.** {3, 4} **47.** $\frac{3}{2}$ **49.** $\{-\frac{2}{3}, \frac{3}{2}\}$ **51.** $\{-\frac{2}{3}, \frac{3}{2}\}$ **53.** $\{-\frac{3}{4}, 2\}$

55. 2 **57.** −1 **59.** 3 **61.** No solution **63.** {0, 4} **65.** {0, 9} **67.** 5.90 **69.** 0.40 **71.** $x = \dfrac{b+c}{a}$ **73.** $x = \dfrac{abc}{a+b}$ **75.** $x = a^2$

77. $\{2 - \sqrt{2}, 2 + \sqrt{2}\}$ **79.** $\{2 - \sqrt{5}, 2 + \sqrt{5}\}$ **81.** $\{1, \frac{3}{2}\}$ **83.** No real solution **85.** $\left\{\dfrac{-1-\sqrt{5}}{4}, \dfrac{-1+\sqrt{5}}{4}\right\}$ **87.** $\{0, \frac{9}{4}\}$

89. $\frac{1}{3}$ **91.** $\left\{\dfrac{1-\sqrt{7}}{3}, \dfrac{1+\sqrt{7}}{3}\right\}$ **93.** $\left\{\dfrac{1-\sqrt{33}}{8}, \dfrac{1+\sqrt{33}}{8}\right\}$ **95.** No real solution **97.** {0.58, 3.41}; $\{2 - \sqrt{2}, 2 + \sqrt{2}\}$

99. {−2.80, 1.07}; $\left\{\dfrac{-\sqrt{3}-\sqrt{15}}{2}, \dfrac{-\sqrt{3}+\sqrt{15}}{2}\right\}$ **101.** {−0.85, 1.17}; $\left\{\dfrac{1 \pm \sqrt{1+4\pi^2}}{2\pi}\right\}$

103. {−8.15, −0.22}; $\left\{\dfrac{-8\pi \pm \sqrt{64\pi^2 - 12\sqrt{29}}}{6}\right\}$ **105.** {−2.64, 2.64}; $\{-\sqrt{7}, \sqrt{7}\}$ **107.** 0.25, $\frac{1}{4}$ **109.** {−0.60, 2.50}; $\{-\frac{3}{5}, \frac{5}{2}\}$

111. {−0.50, 0.66}; $\{-\frac{1}{2}, \frac{2}{3}\}$ **113.** {−1.70, 0.29}; $\left\{\dfrac{-\sqrt{2}+2}{2}, \dfrac{-\sqrt{2}-2}{2}\right\}$ **115.** {−2.56, 1.56}; $\left\{\dfrac{-1-\sqrt{17}}{2}, \dfrac{-1+\sqrt{17}}{2}\right\}$

117. No real solution **119.** Repeated real solution **121.** Two unequal real solutions **123.** $R = \dfrac{R_1 R_2}{R_1 + R_2}$ **125.** $R = \dfrac{mv^2}{F}$ **127.** $r = \dfrac{S-a}{S}$

Exercise 3.3

1. $A = \pi r^2$; r = Radius, A = Area **3.** $A = s^2$; A = Area, s = Length of a side **5.** $F = ma$; F = Force, m = Mass, a = Acceleration
7. $W = Fd$; W = Work, F = Force, d = Distance **9.** $C = 150x$; C = Total cost, x = number of dishwashers
11. $11,000 will be invested in bonds and $9,000 in CD's **13.** Katy will receive $400,000, Mike $300,000, and Dan $200,000
15. The regular hourly rate is $8.50 **17.** The team got 5 touchdowns **19.** The length is 19 ft; the width is 11 ft