MTH-100-Review

Solve the inequality and give the answer as a solution set and in interval notation.

1. $-4 < \frac{5x-2}{3} < 2$

2. $x+1 \le -5 \; or \; -2x+7 < -3$

Find the solution set for each equation or inequality.

3. $|2x-4|+5=13$

4. $|7-3w|=|5w+15|$

5. $6+|2b+5|>13$

6. $|3-2x|>7$

7. Identify the equation that has no solution.

a. $|x-5|-8=-4$
b. $|x-3|+5=5$
c. $|x+7|=-1$
d. $|x-8|=10$

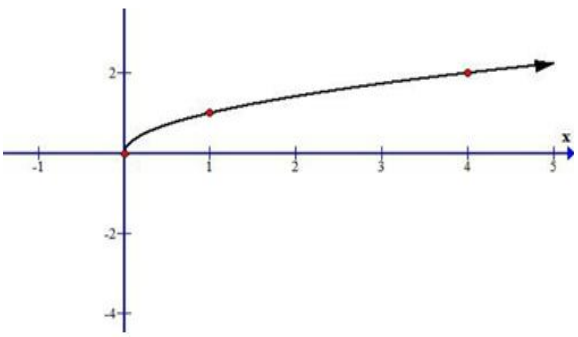
8. Identify the inequality that has a solution set of all real numbers.

a. $|3x+2| \ge 0$
b. $|4x-1|-8<-5$
c. $|x-6| \ge 6$
d. $|5x-1|<0$

Determine if the relation is a function. Give the domain and range.

9. $\{(-1,1), (0,-3), (1,4), (1,5)\}$

10.



Given $f(x) = x^2 - 3x - 4$ and $g(x) = 2x - 5$, find the following.

11. $f(-4)$

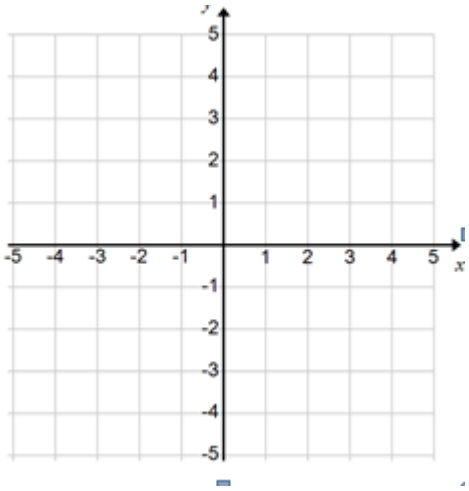
12. $(g - f)(x)$

13. $(f \cdot g)(3)$

14. The number of accidents, *n*, in one month involving drivers x years of age can be approximated by the function $n(x) = 2x^2 - 150x + 4000$. Find the approximate number of accidents in one month that involved 20 year olds.

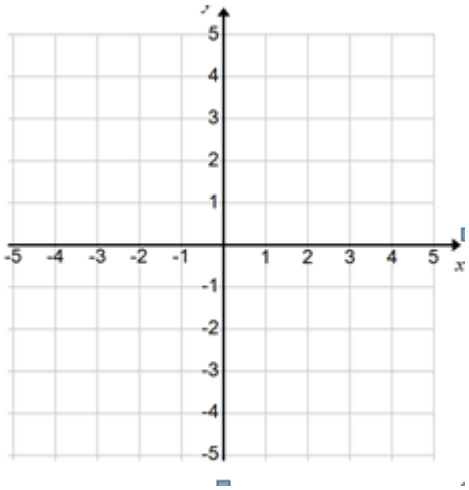
15. Find the *x*- and *y*- intercepts. Use the intercepts to graph the equation.

$3y - 2x = 6$



16. Find the slope of the line through the given points. $(8,7)$ *and* $(-3,9)$

17. Use the slope and y-intercept to graph the function. $f(x) = -2x + 4$



18. Write, in slope-intercept form, the equation of the line that passes through the points $(4,-3)$ *and* $(6,-2)$.

19. Determine whether the two lines are parallel, perpendicular, or neither.

a) $\begin{aligned} 2x-3y&=7 \\ 3x+2y&=-8 \end{aligned}$

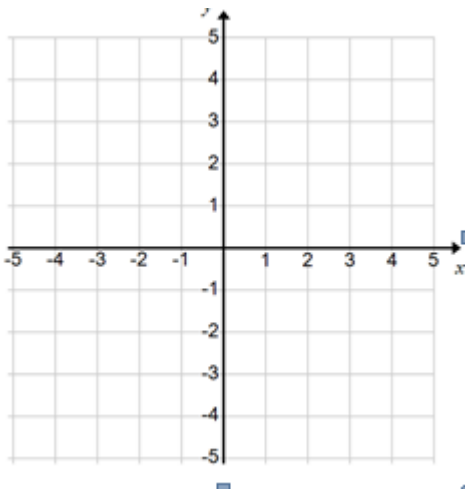
b) $\begin{aligned} y&=\frac{3}{4}x-1 \\ -3x+4y&=7 \end{aligned}$

c) $\begin{aligned} y-3x&=1 \\ y&=-2x+1 \end{aligned}$

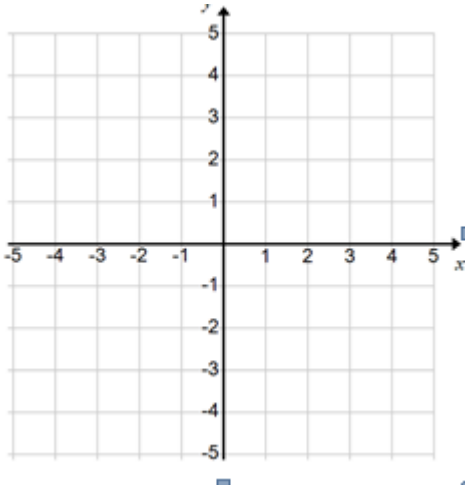
20. Write, in slope-intercept form, the equation of the line that passes through the point $(-10,-3)$ and is parallel to $3x+y=7$.

Graph each inequality.

21. $y<4$



22. $2x - y \geq 1$



Solve the system of equations by using the substitution method or the addition method. For systems that do not have one unique solution, also state the number of solutions and whether the system is inconsistent or the equations are dependent.

23. $$y = \frac{1}{2}x - 2$$
$$4x + 2y = 6$$

24. $$2x - y = 4$$
$$4x + 2 = 2y$$

25. $$y = \frac{1}{3}x + 2$$
$$-x + 3y = 6$$

26. $$y = 2x - 6$$
$$6x - 13y = -12$$

27. $$\begin{aligned} 4x+5y&=2 \\ 3x+4y&=1 \end{aligned}$$

28. $$\begin{aligned} 5x-3y&=9 \\ 18+10x&=6y \end{aligned}$$

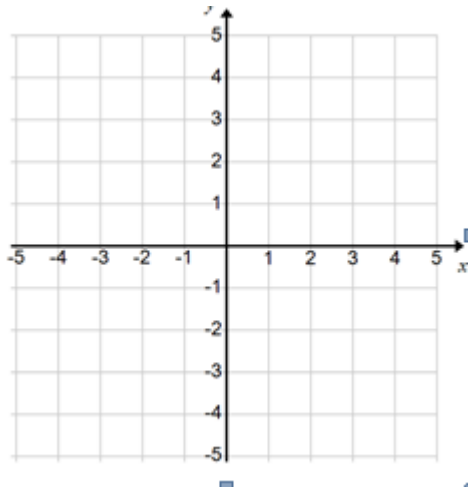
29. Cashews cost \$12 per pound and pecans cost \$6 per pound. William wants to form a 15-pound mixture to sell for a total of \$150. How many pounds of each type should he use?

30. How many ounces of a 60% saline solution and a 20% saline solution must be mixed to obtain 8 ounces of a 50% saline solution?

31. Solve the system of equations.

$$\begin{aligned} 3x+5y+2z&=3 \\ -x-y-z&=-2 \\ 2x-2y+5z&=11 \end{aligned}$$

32. Solve the system of inequalities. $\begin{aligned} 2x - y &< 3 \\ y &\geq -x + 2 \end{aligned}$



Assume all variables represent positive values. Simplify the following expressions. Write all expressions with positive exponents.

33. $3x^2 \cdot x^{-4} \cdot 4x^{-5}$

34. $\dfrac{6^{-1}x^{-5}y^3}{x^2y^{-4}}$

35. $\left(\dfrac{-2x^{-5}}{y^2}\right)^{-3}$

36. a) $(-3x)^0$

b) $-3x^0$

Write the expression in rational exponent form.

37. a) $\sqrt[8]{\dfrac{5x^7}{2z^5}}$

b) $5\sqrt[3]{x^2}$

Write the expression in radical form.

38. a) $\left(10x^2y\right)^{\frac{1}{3}}$

b) $3\left(x^2y\right)^{\frac{4}{5}}$

Evaluate if possible. If the expression is not a real number, so state.

39. $\left(\dfrac{125}{8}\right)^{\frac{1}{3}}$

40. $16^{-\frac{3}{2}}$

41. $(-81)^{\frac{1}{2}}$

Assume all variables represent positive values. Simplify the following expressions. Write all expressions with positive exponents.

42. $\dfrac{\left(64x^6\right)^{\frac{1}{2}}}{x^{-2}}$

43. $\dfrac{x^{-\frac{1}{3}}}{x^{\frac{1}{6}}x^{\frac{5}{2}}}$

Assume all variables represent positive values. Simplify the following expressions.

44. $\sqrt{45x^2y^3}$

45. $\sqrt[3]{56a^{12}b^7}$

46. $\sqrt[4]{\dfrac{3a^9b^{10}}{16a^{-3}}}$

47. $3\sqrt{50}+\sqrt{72}-8\sqrt{18}$

48. $x\sqrt[3]{40x}+\sqrt[3]{135x^4}$

49. $\sqrt[4]{8x^4y}\,\sqrt[4]{2x^2y^3}$

50. $\left(\sqrt{3}-7\right)^2$

51. $\left(\sqrt{3x}-5\sqrt{2}\right)\left(\sqrt{3x}+5\sqrt{2}\right)$

52. $\sqrt{\dfrac{8}{3}}$

53. $\dfrac{6}{\sqrt[3]{x^2}}$

54. $\dfrac{2}{3+\sqrt{5}}$

55. $\dfrac{x+\sqrt{y}}{x-\sqrt{y}}$

Solve each equation and check your solutions.

56. $\sqrt[3]{x-1}+11=8$

57. $\sqrt{x+3}=x-3$

58. $\sqrt{x+1}=2-\sqrt{x}$

Simplify and/or perform the indicated operation. Write the answer in $a+bi$ form.

59. $\sqrt{8}-\sqrt{-45}$

60. $\left(-5-\sqrt{-25}\right)-\left(8+\sqrt{-49}\right)$

61. $\sqrt{-9}\sqrt{-25}$

62. $(3i-8)^2$

63. $\dfrac{6}{5i}$

64. $\dfrac{3+2i}{4-i}$

Evaluate.

65. i^{23}

a. 1 b. -1 c. i d. $-i$

66. i^{102}

a. 1 b. -1 c. i d. $-i$

Solve by factoring.

67. $x^2 - 7x = 18$

68. $3x^2 + 14x - 5 = 0$

Solve by completing the square.

69. $x^2 + 8x - 2 = 0$

70. $3x^2 - 4x = 4$

Solve by using the quadratic formula.

71. $3x^2 - 2x - 7 = 0$

72. $k^2 = 6k - 13$

73. $12m^2 + 5m = 2$

Find the value of the discriminant. Use the discriminant to determine the number of real solutions.

74. $5x^2 - x + 2 = 0$

75. $x^2 + 6x - 40 = 0$

Solve the equations.

76. $x^{\frac{2}{3}} + 4x^{\frac{1}{3}} - 45 = 0$

77. $x^{-2} - 9x^{-1} + 18 = 0$

78. $(x-8)^2 - 13(x-8) = 30$

79. $f(x) = 2x^2 + 3x - 2$.

a. Does the parabola open upward or downward?

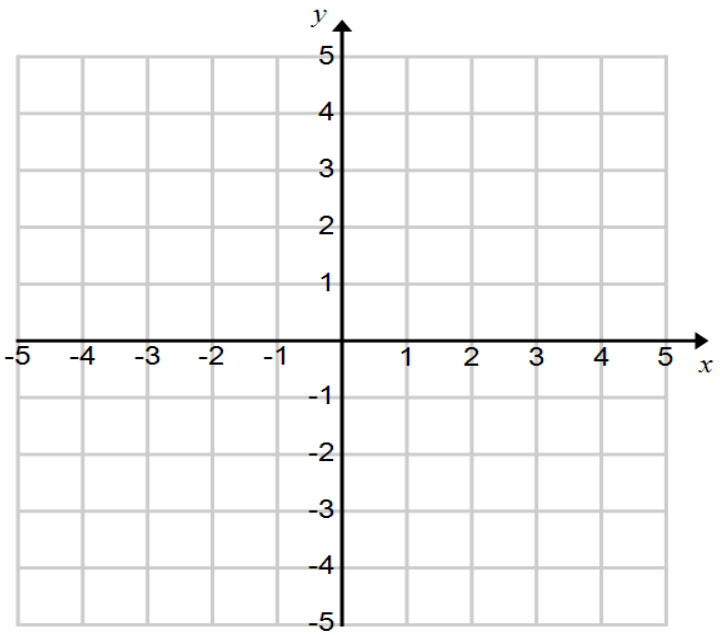
b. Find the y-intercept. Write the y-intercept as an ordered pair.

c. Find the vertex. Write the vertex as an ordered pair.

d. Find the axis of symmetry.

e. Find the x-intercepts. Write any x-intercepts as ordered pairs.

f. Draw the graph.



Solve the inequality and give the answer in interval notation and as a solution set.

80. $x^2 - 6x - 16 \leq 0$

81. $(3x-1)(x+4)(x+2) > 0$

82. $\dfrac{3b+5}{b-6} \leq 0$

For each pair of functions, find **a)** $(f \circ g)(x)$, **b)** $(f \circ g)(4)$, **c)** $(g \circ f)(x)$, and **d)** $(g \circ f)(4)$.

83. $f(x) = 2x - 5,\ g(x) = x + 1$

84. $f(x) = x + 2,\ g(x) = x^2 + 4x - 2$

Find the domain and the range of both $f(x)$ and $f^{-1}(x)$.

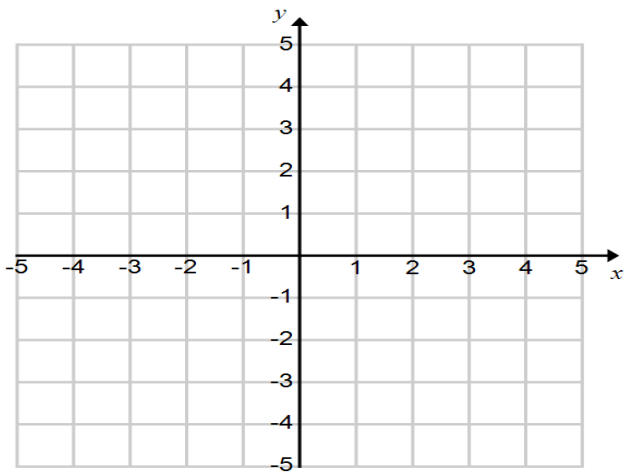
85. $\{(-3,8), (-2,5), (1,3), (0,4)\}$

For each function, **a)** determine whether it is one-to-one; **b)** if it is one-to-one, find its inverse function.

86. $g(x) = 2x - 5$

87. $h(x) = \sqrt[3]{x-5}$

88. Graph. $f(x) = 2^x + 1$



89. A deposit of $3000 is made into a savings account that pays 2.25% compounded quarterly. Determine the accumulated amount in the account after 5 years. Use the compound interest formula $A = p\left(1+\frac{r}{n}\right)^{nt}$ where *p* is the principal, *r* is the interest rate, *n* is the number of compounding periods per year, and *t* is the time in years.

Write the equations in logarithmic form.

90. $2^5 = 32$

91. $3^{-2} = \frac{1}{9}$

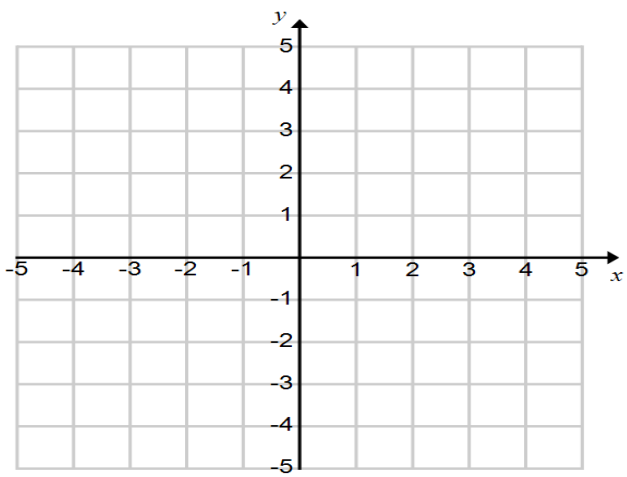
Write the equations in exponential form.

92. $10^{-2} = 0.01$

93. $\left(\frac{1}{4}\right)^3 = \frac{1}{64}$

Graph the logarithmic function.

94. $y = \log_2 x$



Use the properties of logarithms to expand the expression.

95. $\log_2 \dfrac{a^4 b}{c^2}$

96. $\log_b \sqrt[5]{\dfrac{x^4}{yz^3}}$

Write as a logarithm of a single expression.

97. $2\log_9 a + \log_9 (a-5)$

98. $\dfrac{1}{3}\log_2 (a+5) - \log_2 b - \log_2 c$

Evaluate.

99. $\log_b b^{57}$

100. $6^{\log_6 14}$

Use a calculator to approximate the common logarithm. Round your answer to four decimal places.

101. $\log 342$

102. $\log 0.24$

Solve for x. If necessary, round your answers to four decimal places.

103. $\log x = 1.5177$

104. $\log x = -2.103$

105. The magnitude of an earthquake on the Richter scale is given by the formula $R = \log I$, where *I* is the number of times more intense the quake is than the smallest measurable activity. How many times more intense is an earthquake measuring 3.5 on the Richter scale than the smallest measurable activity? Round the answer to the nearest whole number.

Solve the equations. If the answer is irrational, round the answer to the nearest hundredth.

106. $2^{3x-2} = 128$

107. $7^x = \frac{1}{49}$

108. $8^x = 50$

109. $4^{x-1} = 35$

110. $\log_6(3+7x) = 2$

111. $\log_2 x + \log_2(x+2) = 3$

112. $\log_2 x - \log_2 5 = 3$

Approximate the following values. Round your answers to four decimal places.

113. $\ln 50$

114. $\ln 0.425$

115. e^2

116. e^{-3}

Use the change of base formula to approximate the value of the following logarithms. Round your answers to four decimal places.

117. $\log_6 28$

118. $\log_5 230$

119. $\log_3 0.0568$