Solve the equation.

1) $\dfrac{x+4}{6} = \dfrac{5}{6} - \dfrac{x-1}{4}$

First, write the value(s) that make the denominator(s) zero. Then solve the equation.

2) $\dfrac{8}{x} + 9 = \dfrac{5}{2x} + \dfrac{15}{4}$

Solve the equation.

3) $\dfrac{1}{x+4} + \dfrac{2}{x+3} = \dfrac{-1}{x^2+7x+12}$

4) $\dfrac{m+8}{m^2+4m+3} - \dfrac{8}{m^2+6m+9} = \dfrac{m-8}{m^2+4m+3}$

Solve the problem.

5) A car rental agency charges $225 per week plus $0.20 per mile to rent a car. How many miles can you travel in one week for $245?

6) You inherit $10,000 with the stipulation that for the first year the money must be invested in two stocks paying 6% and 11% annual interest, respectively. How much should be invested at each rate if the total interest earned for the year is to be $700?

7) The sum of the angles of a triangle is 180°. Find the three angles of the triangle if one angle is three times the smallest angle and the third angle is 30° greater than the smallest angle.

8) Andrea is having her yard landscaped. She obtained an estimate from two landscaping companies. Company A gave an estimate of $230 for materials and equipment rental plus $65 per hour for labor. Company B gave an estimate of $335 for materials and equipment rental plus $50 per hour for labor. Determine how many hours of labor will be required for the two companies to cost the same.

Solve the formula for the specified variable.

9) $\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{1}{c}$ for c

Find the product and write the result in standard form.

10) $(6 - 2i)^2$

Divide and express the result in standard form.

11) $\dfrac{6-5i}{6+3i}$

Solve the equation by factoring.

12) $12x^2 + 23x + 10 = 0$

Solve the equation by the square root property.

13) $(x-3)^2 = -64$

Solve the equation by completing the square.

14) $x^2 - 8x - 7 = 0$

Solve the equation using the quadratic formula.

15) $2x^2 + 6x + 3 = 0$

16) $6x^2 + 24x + 48 = 0$

Solve the problem.

17) A ladder that is 17 feet long is 8 feet from the base of a wall. How far up the wall does the ladder reach?

18) The length of a rectangular storage room is 3 feet longer than its width. If the area of the room is 180 square feet, find its dimensions.

Solve the polynomial equation by factoring and then using the zero product principle.

19) $3x - 5 = 48x^3 - 80x^2$

Solve the radical equation, and check all proposed solutions.

20) $\sqrt{28x + 28} = x + 8$

21) $x - \sqrt{3x - 2} = 4$

Solve and check the equation.

22) $(x + 6)^{3/2} = 8$

Solve the equation by making an appropriate substitution.

23) $x^{-2} - 11x^{-1} + 10 = 0$

24) $x^{2/5} - x^{1/5} - 2 = 0$

Solve the absolute value equation or indicate that the equation has no solution.

25) $|8x + 6| + 4 = 7$

26) $-7 \le -2x + 3 < -1$

Solve the absolute value inequality. Use interval notation to express the solution set and graph the solution set on a number line.
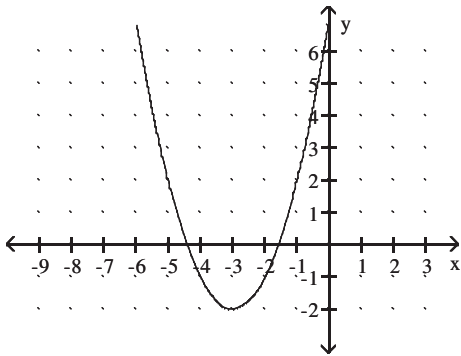
27) $|\, 3(x + 1) + 9 \,| \le 12$

28) $|\, 5 - 7x \,| > 9$

Evaluate the function at the given value of the independent variable and simplify.

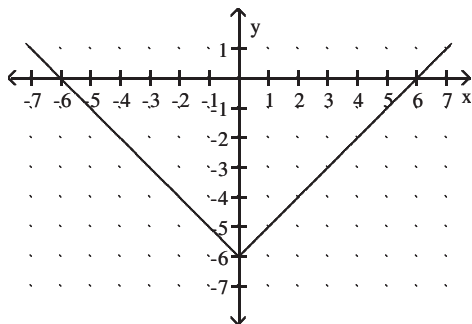29) $f(x) = 3x^2 - 3x - 4;\quad f(x - 1)$

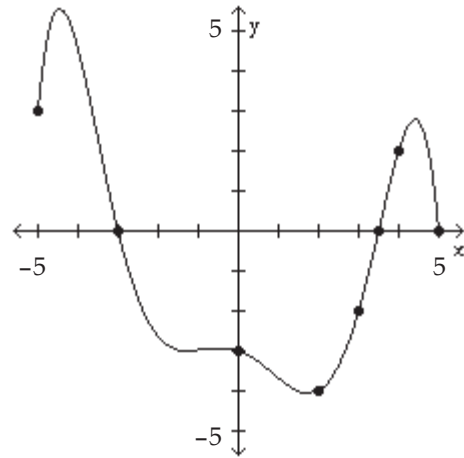**Use the graph to determine the function's domain and range.**

30)

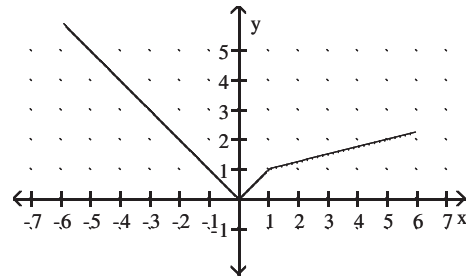**Identify the intercepts.**

31)

The graph of a function f is given. Use the graph to answer the question.

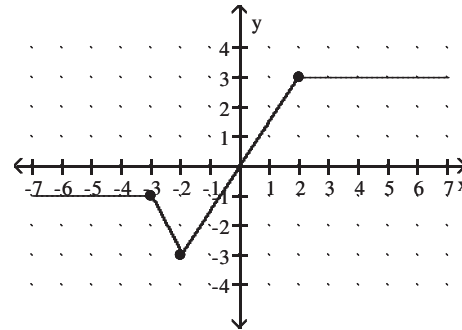32) For what numbers x is $f(x) = 0$?

Use the graph to find the indicated function value.

33) $y = f(x)$. Find $f(-3)$

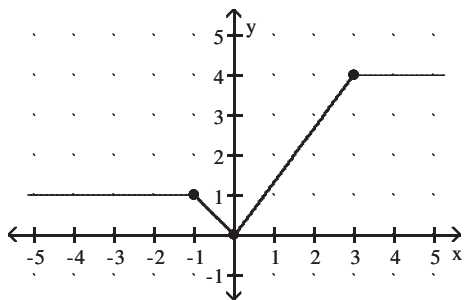**For questions 34–35, use the following graph to identify the intervals on which the function is ...**
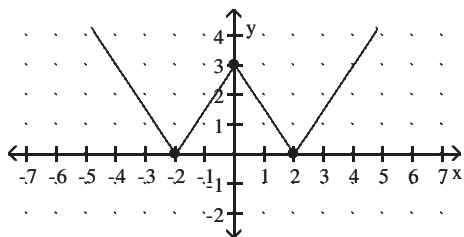

34) Increasing

35) Decreasing

Use the following graph to identify the intervals on which the function is ...

36) Constant

The graph of a function f is given. Use the graph to answer the question.

37) Find the numbers, if any, at which f has a relative minimum. What are the relative minima?

Evaluate f(-x) to determine whether the given function is even, odd, or neither.

38) $f(x) = x^3 - 5x$

39) $f(x) = 2x^2 + x^4$

Evaluate the piecewise function at the given value of the independent variable.

40) $f(x) = \begin{cases} 3x - 2 & \text{if } x < 4 \\ -2x - 3 & \text{if } x \geq 4 \end{cases}$; f(8)
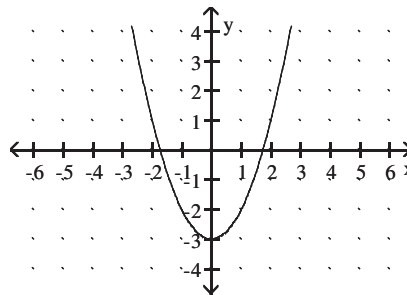
41) $f(x) = \begin{cases} 2x - 4 & \text{if } x < -5 \\ -4x + 3 & \text{if } x \geq -5 \end{cases}$; f(-2)
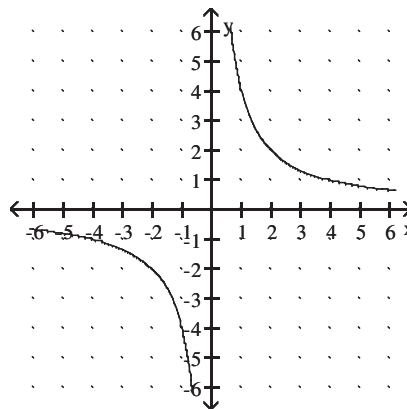
Graph the function.

42) $f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 2x - 3 & \text{if } x \geq 2 \end{cases}$

Use possible symmetry to determine whether the graph is the graph of an even function, an odd function, or a function that is neither even nor odd.

43)

44)

Find and simplify the difference quotient,
$\dfrac{f(x + h) - f(x)}{h}$**, h ≠ 0 for the given function.**

45) $f(x) = 2x - 5$

46) $f(x) = 9x^2$

Use the given conditions to write an equation for the line in slope–intercept form.

47) Passing through $(1, -8)$ and $(-7, 8)$

Graph the linear function by plotting the x– and y–intercepts.

48) $6x - 12y - 36 = 0$

**Use the given conditions to write an equation for the line in the indicated form.**

49) Passing through $(4, 2)$ and parallel to the line whose equation is $4x + y - 6 = 0$; slope–intercept form

50) Passing through $(2, 5)$ and perpendicular to the line whose equation is $-8x + y - 8 = 0$; slope–intercept form

For questions 51–52, use the graph of the function f, plotted with a solid line, to sketch the graph of the given function g.
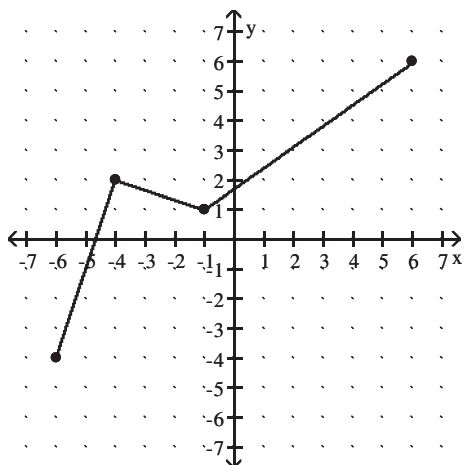
$$y = f(x)$$
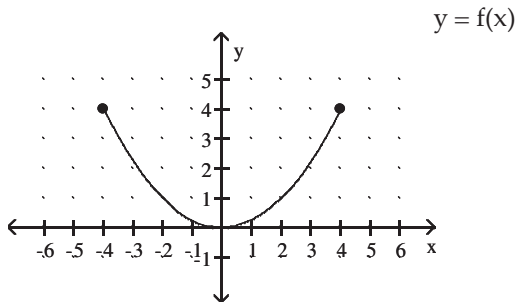
51) $g(x) = f(x + 2) - 1$

52) $g(x) = -f(x - 2) + 1$

Use the graph of $y = f(x)$ to graph the given function g.

53) $g(x) = -2f(x)$

Begin by graphing the standard square root function $f(x) = \sqrt{x}$. Then use transformations of this graph to graph the given function.

54) $g(x) = -\sqrt{x + 2} - 1$

Begin by graphing the cube root function $f(x) = \sqrt[3]{x}$ Then use transformations of this graph to graph the given function.

55) $g(x) = -\sqrt[3]{x + 3}$

Find the domain of the function.

56) $g(x) = \dfrac{2x}{x^2 - 36}$

Given functions f and g, perform the indicated operations.

57) $f(x) = 9x^2 - 5x, \quad g(x) = x^2 - 2x - 15$

Find $\dfrac{f}{g}(x)$.

For the given functions f and g, find the requested composite function.

58) $f(x) = \sqrt{x + 10}, \quad g(x) = 8x - 14$;
Find $(f \circ g)(x)$.

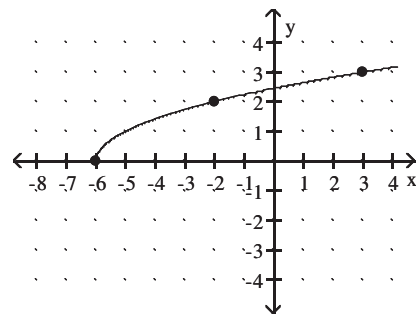59) $f(x) = 4x^2 + 5x + 8, \quad g(x) = 5x - 6$;
Find $(g \circ f)(x)$.

Find the inverse of the one–to–one function.

60) $f(x) = (x + 6)^3$

Use the graph of f to draw the graph of its inverse function.

61)

Find the distance between the pair of points.

62) $(2, -5)$ and $(6, -3)$

Find the midpoint of the line segment whose end points are given.

63) $(5, -4)$ and $(7, -1)$

Complete the square and write the equation in standard form. Then give the center and radius of the circle.

64) $x^2 + y^2 + 12x - 2y = -28$

For questions 65–66, use the vertex, axis of symmetry, and intercepts to sketch the graph of the quadratic function.

65) $f(x) = 9 - (x + 3)^2$

66) $f(x) = -x^2 - 4x + 5$

Solve the problem.

67) A person standing close to the edge on top of a 128–foot building throws a baseball vertically upward. The quadratic function $s(t) = -16t^2 + 64t + 128$ models the ball's height above the ground, $s(t)$, in feet, t seconds after it was thrown. After how many seconds does the ball reach its maximum height? Round to the nearest tenth of a second if necessary.

68) April shoots an arrow upward into the air at a speed of 64 feet per second from a platform that is 21 feet high. The height of the arrow is given by the function $h(t) = -16t^2 + 64t + 21$, where t is the time is seconds. What is the maximum height of the arrow?

Find the vertical asymptotes, if any, of the graph of the rational function.

69) $h(x) = \dfrac{x + 4}{x^2 - 16}$

70) $g(x) = \dfrac{x - 9}{x^2 - 10x + 24}$

Find the horizontal asymptote, if any, of the graph of the rational function.

71) $f(x) = \dfrac{4x}{2x^2 + 1}$

72) $g(x) = \dfrac{12x^2}{3x^2 + 1}$

Use transformations of $f(x) = \dfrac{1}{x}$ or $f(x) = \dfrac{1}{x^2}$ to graph the rational function.

73) $f(x) = \dfrac{1}{x - 5} + 3$

74) $f(x) = \dfrac{1}{(x + 3)^2} + 4$

Graph the rational function. Be sure to accurately show all asymptotes and intercepts.

75) $f(x) = \dfrac{x - 2}{x^2 - x - 20}$

76) $f(x) = \dfrac{x^2 - x - 56}{x^2 - 1}$

Solve the inequality and graph the solution set on a number line. Express the solution set in interval notation.

77) $x^2 + 3x \geq 4$

78) $\dfrac{-x + 4}{x - 2} \geq 0$

79) $\dfrac{x + 4}{x + 2} < 4$

Graph the function.

80) Use the graph of $f(x) = 2^x$ to obtain the graph of $g(x) = 2^{x - 2} - 2$.

81) Use the graph of $f(x) = e^x$ to obtain the graph of $g(x) = e^{-x}$.

Use the compound interest formulas $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to solve.

82) Suppose that you have $10,000 to invest. Which investment yields the greater return over 6 years: 8.75% compounded continuously or 8.9% compounded semiannually?

Graph the function.

83) Use the graph of $y = \log_4 x$ to obtain the graph of $f(x) = \log_4 (x + 1)$.

84) Use the graph of $y = \log_4 x$ to obtain the graph of $f(x) = 2 + \log_4 x$.

85) Use the graph of $f(x) = \ln x$ to obtain the graph of $g(x) = 4 - \ln x$.

5

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

86) $\log_b\left(\dfrac{xy^7}{z^2}\right)$

Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

87) $\dfrac{1}{4}(\log_4 x + \log_4 y) - 3\log_4 (x + 7)$

Solve the exponential equation. Express the solution set in terms of natural logarithms.

88) $4^{x + 8} = 7$

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

89) $e^{2x - 3} - 4 = 1402$

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

90) $\log_4 (x + 5) + \log_4 (x - 1) = 2$

91) $7 + 3 \ln x = 15$

92) $\log_2 (x + 4) - \log_2 (x - 2) = 2$

Solve the problem.

93) The formula $A = 173e^{0.046t}$ models the population of a particular city, in thousands, t years after 1998. When will the population of the city reach 329 thousand?

94) Larry has $2900 to invest and needs $3500 in 11 years. What annual rate of return will he need to get in order to accomplish his goal, if interest is compounded continuously? (Round your answer to two decimals.)

95) If Emery has $2000 to invest at 11% per year compounded monthly, how long will it be before he has $3000? If the compounding is continuous, how long will it be? (Round your answers to three decimal places.)

Solve the system of equations.

96) $2x + 5y = 2$
$-7x - 3y = 22$

97) $-9x + y = 5$
$-3x - 4y = -7$

Solve the problem.

98) The Family Fine Arts Center charges $20 per adult and $10 per senior citizen for its performances. On a recent weekend evening when 511 people paid admission, the total receipts were $7020. How many who paid were senior citizens?

99) A bank teller has 46 $10 and $20 bills in her cash drawer. The value of the bills is $820. How many $10 bills are there?

Graph the solution set of the system of inequalities or indicate that the system has no solution.

100) $x^2 + y^2 \le 81$
$y > 3^x$

101) $x^2 + y^2 \le 4$
$y - x^2 > 0$

102) $x + y \le 7$
$y \ge 5x - 3$
$x \ge 0$
$y \ge 0$

Solve the problem.

103) A candy company has 130 pounds of cashews and 170 pounds of peanuts which they combine into two different mixes. The deluxe mix has half cashews and half peanuts and sells for $7 per pound. The economy mix has one third cashews and two thirds peanuts and sells for $5.40 per pound. How many pounds of each mix should be prepared for maximum revenue?