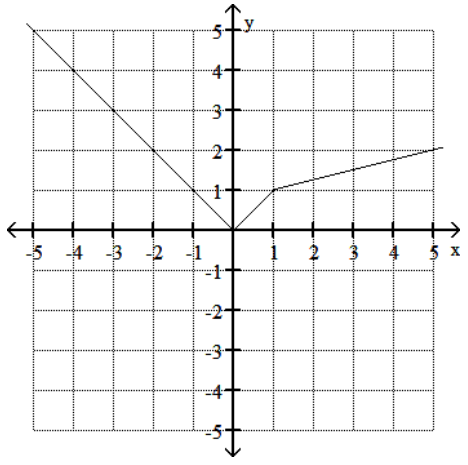
Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

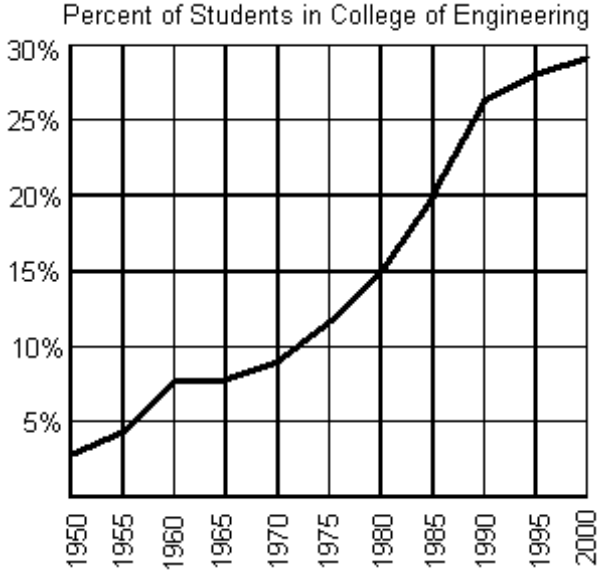
Use the graph to find the indicated function value.

1) y = f(x). Find f(-2) 1) _____



A) 5 B) -2 C) 2 D) 1.25

The graph below shows the percentage of students enrolled in the College of Engineering at State University. Use the graph to answer the question.

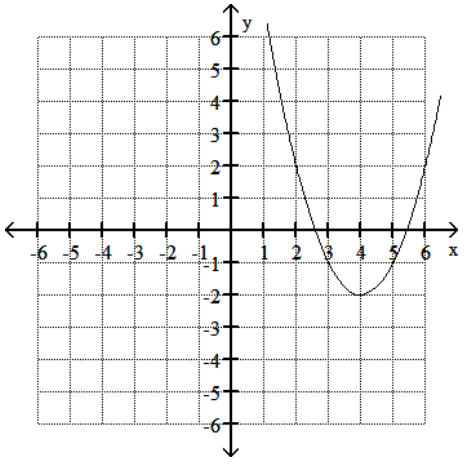


2) If f(x) = 9%, what year is represented by x? 2) _____

A) 1960 B) 1975 C) 1970 D) 1965

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

3) 3) _____



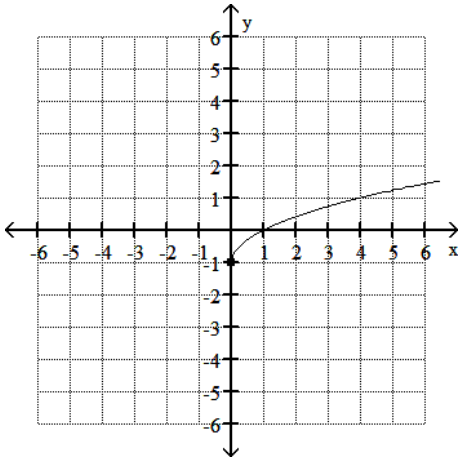
A) domain: $(-\infty, \infty)$
range: $(-\infty, \infty)$

B) domain: $(-\infty, \infty)$
range: $[-2, \infty)$

C) domain: $(-\infty, 4)$ or $(4, \infty)$
range: $(-\infty, -2)$ or $(-2, \infty)$

D) domain: $[4, \infty)$
range: $[-2, \infty)$

4) 4) _____



A) domain: $[0, \infty)$
range: $(-\infty, \infty)$

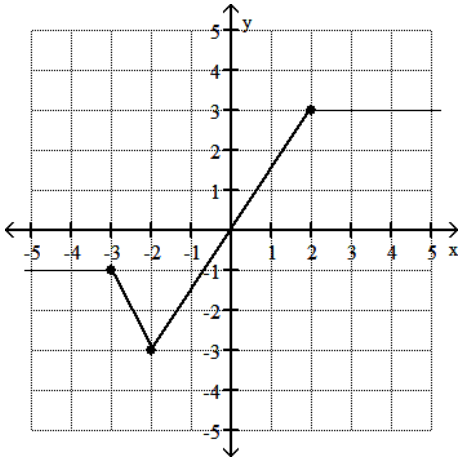
B) domain: $(-\infty, \infty)$
range: $[-1, \infty)$

C) domain: $[0, \infty)$
range: $[-1, \infty)$

D) domain: $[0, \infty)$
range: $[0, \infty)$

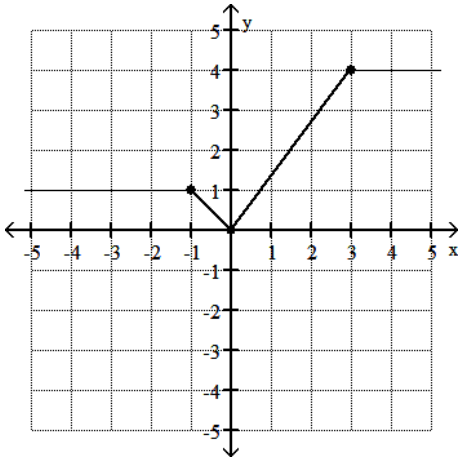
Identify the intervals where the function is changing as requested.

5) Increasing 5) _____



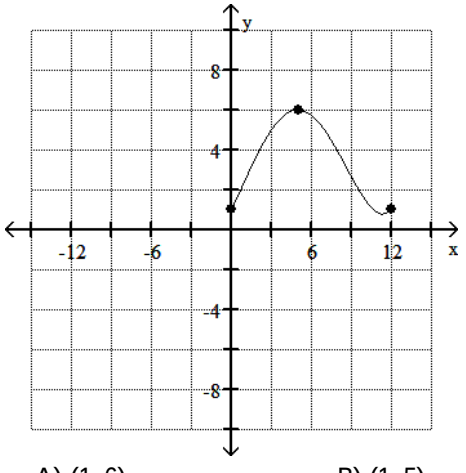
A) (-2, 2) B) (-3, ∞) C) (-2, ∞) D) (-3, 3)

6) Constant 6) _____



A) (-∞, -1) or (3, ∞) B) (-∞, 0)
C) (3, ∞) D) (-1, 0)

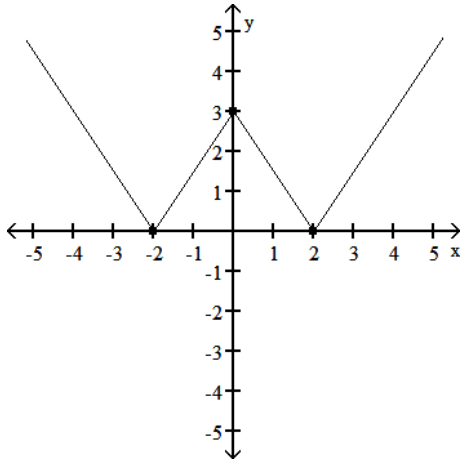
7) Increasing 7) _____



A) (1, 6) B) (1, 5) C) (0, 5) D) (0, 6)

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

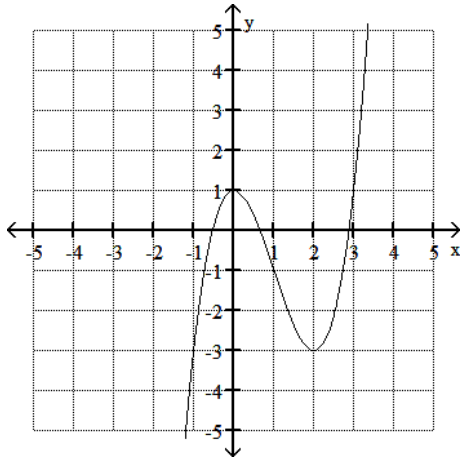
8) Find the numbers, if any, at which f has a relative minimum. What are the relative minima? 8) _____



A) f has a relative minimum at x = -2; the relative minimum is 0
B) f has a relative minimum at x = 0; the relative minimum is 3
C) f has a relative minimum at x = -2 and 2; the relative minimum is 0
D) f has no relative minimum

Use the graph of the given function to find any relative maxima and relative minima.

9) $f(x) = x^3 - 3x^2 + 1$ 9) _____



A) maximum: none; minimum: (2, -3)
B) maximum: (0, 1); minimum: none
C) maximum: (0, 1); minimum: (2, -3)
D) no maximum or minimum

Determine whether the given function is even, odd, or neither.

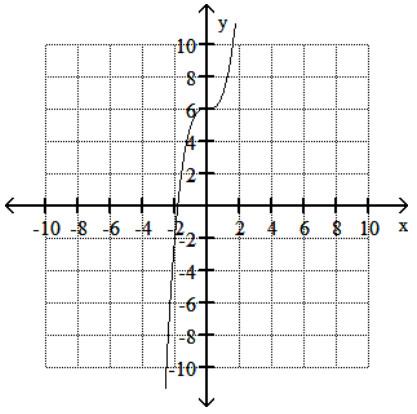
10) $f(x) = x^3 - 2x$ 10) _____
A) Neither B) Odd C) Even

11) $f(x) = 2x^2 + x^4$ 11) _____
A) Odd B) Even C) Neither

12) $f(x) = x^3 + x^2 + 4$ 12) _____
A) Odd B) Even C) Neither

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.

13) 13) _____



A) Odd B) Even C) Neither

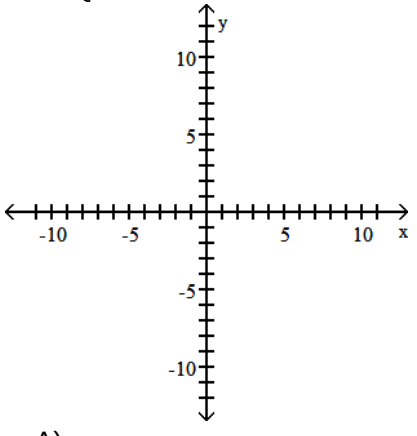
Evaluate the piecewise function at the given value of the independent variable.

14) $f(x) = \begin{cases} 3x + 3 & \text{if } x < -4 \\ 4x + 2 & \text{if } x \geq -4 \end{cases}$; $f(-2)$ 14) _____

A) -4 B) -6 C) -5 D) -3

Graph the function.

15) $f(x) = \begin{cases} x + 2 & \text{if } -8 \leq x < 4 \\ -8 & \text{if } x = 4 \\ -x + 7 & \text{if } x > 4 \end{cases}$ 15) _____



A) B) C)

Solve the problem.

16) A salesperson gets a commission of $1400 for the first $10,000 of sales, and then $700 for each additional $10,000 or partial of sales. Let S(x) represent the commission on x dollars of sales. Find the value of S(55,000). 16) _____

A) $3850 B) 5250 C) $4900 D) $4550

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

17) One Internet service provider has the following rate schedule for high-speed Internet service: 17) _____

Monthly service charge	$18.00
1st 50 hours of use	free
Next 50 hours of use	$0.25/hour
Over 100 hours of use	$1.00/hour

What is the charge for 50 hours of high-speed Internet use in one month?
What is the charge for 75 hours of high-speed Internet use in one month?
What is the charge for 135 hours of high-speed Internet use in one month?

18) The wind chill factor represents the equivalent air temperature at a standard wind speed that would produce the same heat loss as the given temperature and wind speed. One formula for computing the equivalent temperature is 18) _____

$$W(t) = \begin{cases} t & \text{if } 0 \le v < 1.79 \\ 33 - \dfrac{(10.45 + 10\sqrt{v} - v)(33 - t)}{22.04} & \text{if } 1.79 \le v < 20 \\ 33 - 1.5958(33 - t) & \text{if } v \ge 20 \end{cases}$$

where v represents the wind speed (in meters per second) and t represents the air temperature (°C). Compute the wind chill for an air temperature of 15°C and a wind speed of 12 meters per second. (Round the answer to one decimal place.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

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

19) $f(x) = 2x^2$ 19) _____

A) $\frac{4}{h} + x + 2h$ B) 2

C) 2(2x+h) D) $\frac{2(2x^2 + 2xh + h^2)}{h}$

20) $f(x) = \frac{1}{5x}$ 20) _____

A) $\frac{-1}{5x(x+h)}$ B) $\frac{1}{5x}$ C) $\frac{-1}{x(x+h)}$ D) 0

Use the given conditions to write an equation for the line in point-slope form.

21) Passing through (7, 2) and (8, 8) 21) _____

A) y - 2 = 7(x + 7) or y - 8 = 8(x - 2) B) y - 2 = 6(x - 8) or y - 8 = 6(x - 7)
C) y - 2 = 6(x - 7) or y - 8 = 6(x - 8) D) y + 2 = 6(x + 7) or y + 8 = 6(x + 8)

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

22) Slope = $\frac{5}{9}$, y-intercept = 2 22) _____

A) $f(x) = -\frac{5}{9}x - 2$ B) $f(x) = \frac{9}{5}x + \frac{18}{5}$ C) $f(x) = \frac{5}{9}x - 2$ D) $f(x) = \frac{5}{9}x + 2$

Determine the slope and the y-intercept of the graph of the equation.

23) $x + 11y - 1 = 0$ 23) _____

A) $m = -\frac{1}{11}; \left(0, \frac{1}{11}\right)$ B) m = -11; (0, 11)

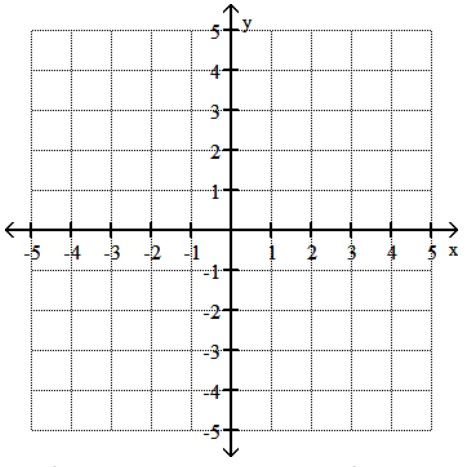
C) $m = \frac{1}{11}; \left(0, \frac{1}{11}\right)$ D) m = 1; (0, 1)

24) $-x + 6y - 12 = 0$ 24) _____

A) m = 6; (0, -12) B) $m = \frac{1}{6}$; (0, 2) C) $m = -\frac{1}{6}$; (0, 2) D) m = -1; (0, 12)

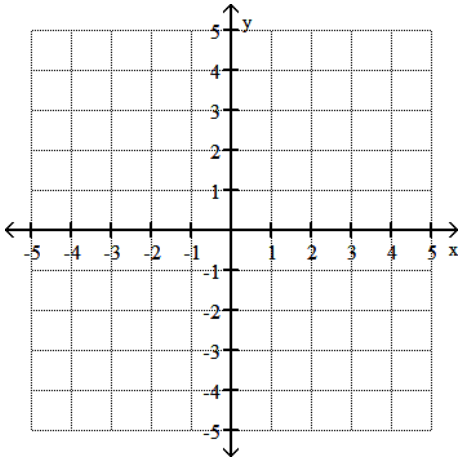
Graph the equation.

25) $2x + 3y - 10 = 0$ 25) _____



A) B) C) D)

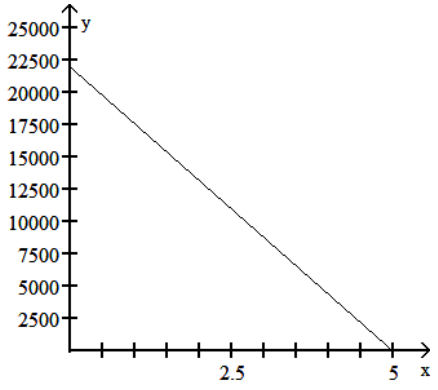
26) $2x - 5y + 16 = 0$ 26) _____



A) B) C) D)

Solve.

27) A school has just purchased new computer equipment for $22,000.00. The graph shows the depreciation of the equipment over 5 years. The point (0, 22,000) represents the purchase price and the point (5, 0) represents when the equipment will be replaced. Write a linear equation in slope-intercept form that models the value of the equipment, y, x years after purchase. Use the model to predict the value of the equipment after 3 years? 27) _____



A) $y = -22{,}000x + 22{,}000$;
value after 3 years is $\$-44{,}000.00$

B) $y = -4400x + 22{,}000$;
value after 3 years is $8800.00;

C) $y = 4400x - 22{,}000$;
value after 3 years is $8800.00

D) $y = 22{,}000x + 5$;
value after 3 years is $8800.00

28) An investment is worth $3064 in 1994. By 1998 it has grown to $4400. Let y be the value of the investment in the year x, where x = 0 represents 1994. Write a linear equation that models the value of the investment in the year x. 28) _____

A) $y = 334x + 3064$

B) $y = -334x + 5736$

C) $y = \frac{1}{334}x + 3064$

D) $y = -334x + 3064$

29) A vendor has learned that, by pricing pretzels at $1.00, sales will reach 104 pretzels per day. Raising the price to $1.50 will cause the sales to fall to 80 pretzels per day. Let y be the number of pretzels the vendor sells at x dollars each. Write a linear equation that models the number of pretzels sold per day when the price is x dollars each. 29) _____

A) $y = -\frac{1}{48}x + \frac{4991}{48}$

B) $y = -48x - 152$

C) $y = 48x + 56$

D) $y = -48x + 152$

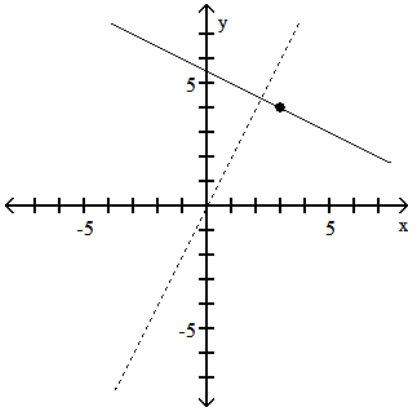
Use the given conditions to write an equation for the line in the indicated form.

30) Passing through (5, 4) and parallel to the line whose equation is $y = 2x - 6$; point-slope form 30) _____

A) $y - 4 = x - 5$ B) $y = 2x$ C) $y - 4 = 2(x - 5)$ D) $y - 5 = 2(x - 4)$

Find an equation for the line with the given properties.

31) The solid line L contains the point (3, 4) and is perpendicular to the dotted line whose equation is $y = 2x$. Give the equation of line L in slope-intercept form. 31) _____



A) $y - 4 = -\frac{1}{2}(x - 3)$

B) $y = -\frac{1}{2}x + \frac{11}{2}$

C) $y - 4 = 2(x - 3)$

D) $y = \frac{1}{2}x + \frac{11}{2}$

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

32) Passing through (5, 3) and parallel to the line whose equation is $y = -2x + 3$; point-slope form 32) _____

A) $y - 5 = -2(x - 3)$ B) $y - 3 = -2(x - 5)$ C) $y - 3 = x - 5$ D) $y = 2x$

Find the slope then describe what it means in terms of the rate of change of the dependent variable per unit change in the independent variable.

33) The linear function f(x) = 4.6x + 35 represents the percentage of people, f(x), who graduated from college x years after 1998. 33) _____

A) m = 4.6; the percentage of people graduating from college has decreased at a rate of 4.6% per year after 1998.

B) m = 4.6; the percentage of people graduating from college has increased at a rate of 4.6% per year after 1998.

C) m = 35; the percentage of people graduating from college has increased at a rate of 35% per year after 1998.

D) m = -4.6; the percentage of people graduating from college has decreased at a rate of 4.6% per year after 1998.

Find the average rate of change of the function from x_1 to x_2.

34) $f(x) = \sqrt{2x}$ from $x_1 = 2$ to $x_2 = 8$ 34) _____

A) 7 B) 2 C) $-\frac{3}{10}$ D) $\frac{1}{3}$

35) $f(x) = -3x^2 - x$ from $x_1 = 5$ to $x_2 = 6$ 35) _____

A) $\frac{1}{2}$ B) $-\frac{1}{6}$ C) -2 D) -34

Solve the problem.

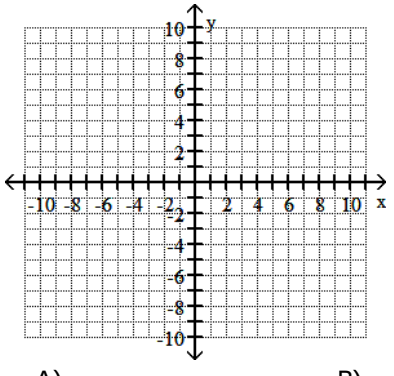
36) A deep sea diving bell is being lowered at a constant rate. After 11 minutes, the bell is at a depth of 400 ft. After 40 minutes the bell is at a depth of 1900 ft. What is the average rate of lowering per minute? Round to the nearest hundredth as needed. 36) _____

A) 37.50 ft per minute B) 47.50 ft per minute

C) 51.72 ft per minute D) 0.02 ft per minute

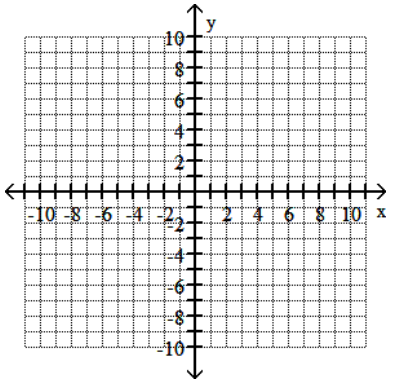
Begin by graphing the standard quadratic function $f(x) = x^2$. Then use transformations of this graph to graph the given function.

37) $h(x) = (x + 6)^2 - 3$ 37) _____



A) B) C) D)

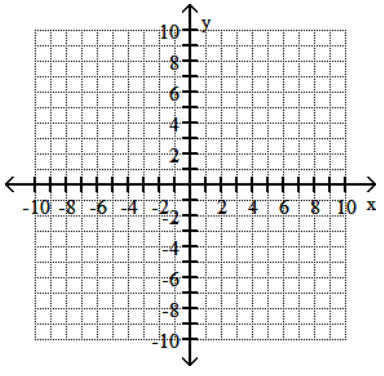
38) $g(x) = -\frac{1}{2}(x + 2)^2 + 3$ 38) _____



A) B) C) D)

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

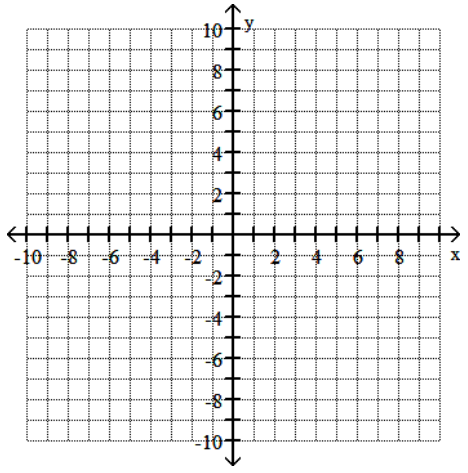
39) $h(x) = \sqrt{-x + 2} + 2$ 39) _____



A) B) C) D)

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

40) $g(x) = -\sqrt[3]{x + 4}$ 40) _____



A) B) C) D)

Find the domain of the function.

41) $f(x) = \dfrac{x^2}{x^2 + 10}$ 41) _____

A) $(-\infty, -10) \cup (-10, \infty)$
B) $(-\infty, 0) \cup (0, \infty)$
C) $(-10, \infty)$
D) $(-\infty, \infty)$

42) $h(x) = \dfrac{x - 2}{x^3 - 49x}$ 42) _____

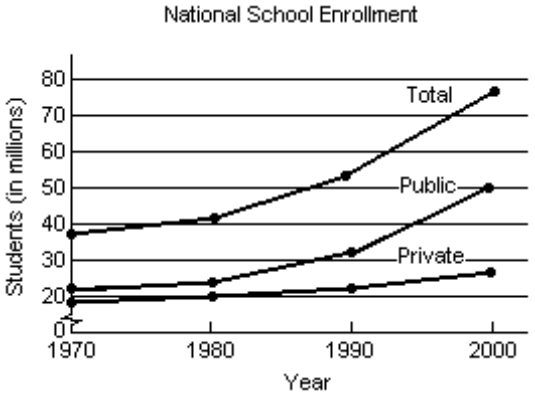
A) $(-\infty, -7) \cup (-7, 0) \cup (0, 7) \cup (7, \infty)$
B) $(-\infty, 0) \cup (0, \infty)$
C) $(-\infty, \infty)$
D) $(-\infty, 2) \cup (2, \infty)$

43) $f(x) = \dfrac{1}{x - 2} + \dfrac{4}{x + 8}$ 43) _____

A) $(-\infty, \infty)$
B) $(-\infty, 2) \cup (2, \infty)$
C) $(-\infty, -8) \cup (-8, 2) \cup (2, \infty)$
D) $(-\infty, -8) \cup (-8, \infty)$

Solve the problem.

44) The following graph shows the private, public and total national school enrollment for students for select years from 1970 through 2000. 44) _____



i) How is the graph for total school enrollment, T, determined from the graph of the private enrollment, r, and the public enrollment, u?
ii) During which 10-year period did the total number of students enrolled increase the least?
iii) During which 10-year period did the total number of students enrolled increase the most?

A) i) T is the sum of r and u.
ii) 1970 - 1980
iii) 1990-2000

B) i) T is the difference of r and u.
ii) 1970 - 1980
iii) 1990-2000

C) i) T is the sum of r and u.
ii) 1970 - 1980
iii) 1980-1990

D) i) T is the sum of r and u.
ii) 1990-2000
iii) 1970-1980

For the given functions f and g , find the indicated composition.

45) $f(x) = 17x^2 - 10x$, $g(x) = 9x - 9$ 45) _____

$(f \circ g)(8)$

A) 66,843 B) 63,504 C) 57,780 D) 9063

46) $f(x) = \frac{7}{x + 4}$, $g(x) = \frac{4}{5x}$ 46) _____

$(f \circ g)(x)$

A) $\frac{35x}{4 - 20x}$ B) $\frac{35x}{4 + 20x}$ C) $\frac{4x + 16}{35x}$ D) $\frac{7x}{4 + 20x}$

Find the domain of the composite function $f \circ g$.

47) $f(x) = \frac{4}{x + 8}$, $g(x) = x + 5$ 47) _____

A) $(-\infty, -8)$ or $(-8, \infty)$
B) $(-\infty, -13)$ or $(-13, \infty)$
C) $(-\infty, -8)$ or $(-8, -5)$ or $(-5, \infty)$
D) $(-\infty, \infty)$

48) $f(x) = \sqrt{x}$; $g(x) = 3x + 18$ 48) _____

A) $(-\infty, -6]$ or $[0, \infty)$
B) $[0, \infty)$
C) $(-\infty, \infty)$
D) $[-6, \infty)$

49) $f(x) = 5x + 10$; $g(x) = \sqrt{x}$ 49) _____

A) $(-\infty, -2]$ or $[0, \infty)$ B) $[-2, \infty)$

C) $[0, \infty)$ D) $(-\infty, \infty)$

Determine which two functions are inverses of each other.

50) $f(x) = \sqrt{x}$ $g(x) = \frac{1}{\sqrt{x}}$ $h(x) = x^2$ 50) _____

A) g(x) and h(x) B) f(x) and g(x) C) None D) f(x) and h(x)

51) $f(x) = \frac{x - 2}{2}$ $g(x) = 2x - 2$ $h(x) = \frac{x - 2}{-2}$ 51) _____

A) f(x) and h(x) B) None C) f(x) and g(x) D) g(x) and h(x)

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

52) $f(x) = \frac{3}{2x + 1}$ 52) _____

A) $f^{-1}(x) = \frac{1}{2} - \frac{3}{2x}$ B) $f^{-1}(x) = \frac{3}{2y} - \frac{1}{2}$

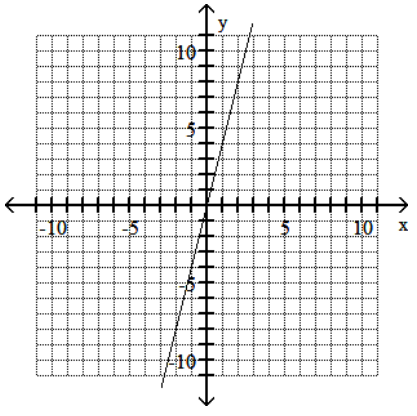
C) $f^{-1}(x) = \frac{2x + 1}{3}$ D) $f^{-1}(x) = \frac{3}{2x} - \frac{1}{2}$

53) $f(x) = \sqrt[3]{x - 8}$ 53) _____

A) $f^{-1}(x) = x^3 + 8$ B) $f^{-1}(x) = x^3 + 64$ C) $f^{-1}(x) = x + 8$ D) $f^{-1}(x) = \frac{1}{x^3 + 8}$

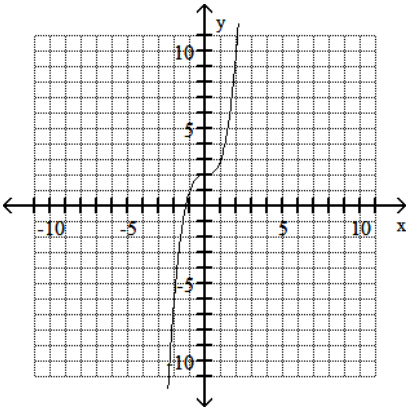
Use the graph of f to draw the graph of its inverse function.

54) 54) _____



A) B)

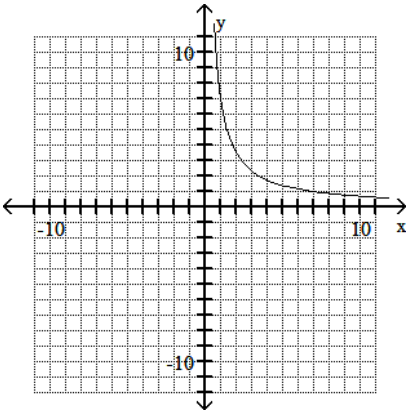
55) 55) _____



A) B)

56) 56) _____

A) B) C) D)

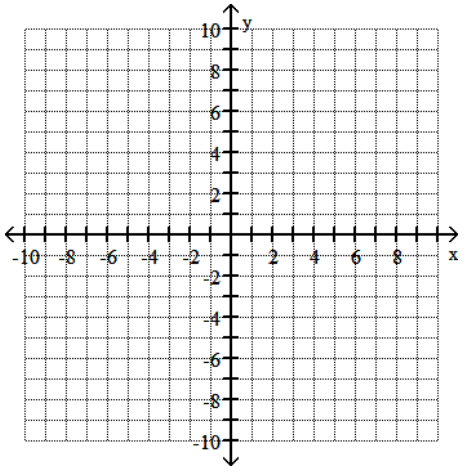


57) 57) _____

A) B) C) D)

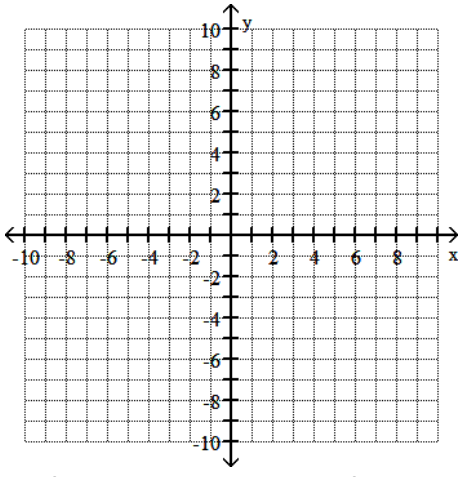
Graph f as a solid line and f^{-1} as a dashed line in the same rectangular coordinate space. Use interval notation to give the domain and range of f and f^{-1}.

58) $f(x) = x^2 - 4, x \geq 0$ 58) _____



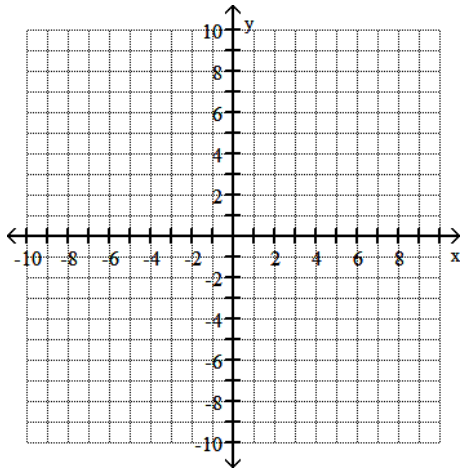
A) B) C) D)

59) $f(x) = (x - 2)^2, x \geq 2$ 59) _____



A) B) C) D)

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



A) B) C) *f* D)

Find the distance between the pair of points.

61) $(3\sqrt{3}, 2)$ and $(7\sqrt{3}, 3)$ 61) _____

A) 49 B) 6 C) 7 D) $\frac{49}{2}$

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

62) $(3, -\frac{6}{5})$ and $(\frac{8}{3}, -\frac{2}{5})$ 62) _____

A) $(\frac{1}{6}, -\frac{2}{5})$ B) $(-\frac{1}{6}, \frac{2}{5})$ C) $(\frac{17}{3}, -\frac{8}{5})$ D) $(\frac{17}{6}, -\frac{4}{5})$

Write the standard form of the equation of the circle with the given center and radius.

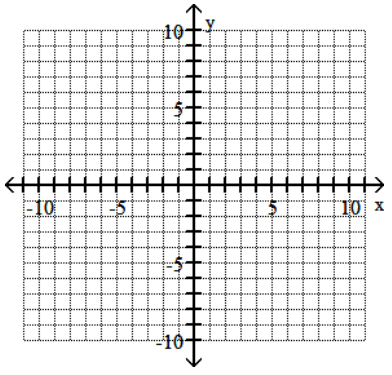
63) $(-9, 8)$; 3 63) _____

A) $(x - 8)^2 + (y + 9)^2 = 3$ B) $(x + 9)^2 + (y - 8)^2 = 9$

C) $(x + 8)^2 + (y - 9)^2 = 3$ D) $(x - 9)^2 + (y + 8)^2 = 9$

Graph the equation.

64) $(x - 1)^2 + (y - 5)^2 = 4$ 64) _____



A) B)

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

65) $x^2 + y^2 + 6x - 2y + 10 = 36$ 65) _____

A) $(x - 1)^2 + (y + 3)^2 = 36$
$(-1, 3)$, $r = 36$

B) $(x + 3)^2 + (y - 1)^2 = 36$
$(3, -1)$, $r = 36$

C) $(x + 3)^2 + (y - 1)^2 = 36$
$(-3, 1)$, $r = 6$

D) $(x - 1)^2 + (y + 3)^2 = 36$
$(1, -3)$, $r = 6$

66) $x^2 + y^2 + 12x + 12y + 62 = 0$ 66) _____

A) $(x + 6)^2 + (y + 6)^2 = 10$
$(6, 6)$, $r = \sqrt{10}$

B) $(x + 6)^2 + (y + 6)^2 = 10$
$(-6, -6)$, $r = 10$

C) $(x - 6)^2 + (y - 6)^2 = 10$
$(6, 6)$, $r = \sqrt{10}$

D) $(x + 6)^2 + (y + 6)^2 = 10$
$(-6, -6)$, $r = \sqrt{10}$

Solve the problem.

67) An open box is made from a square piece of sheet metal 20 inches on a side by cutting identical squares from the corners and turning up the sides. Express the volume of the box, V, as a function of the length of the side of the square cut from each corner, x. 67) _____

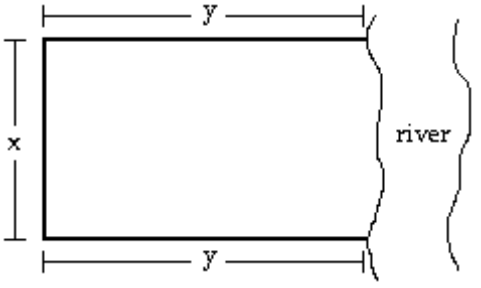
A) $V(x) = x(20 - 2x)$

B) $V(x) = (20 - 2x)^2$

C) $V(x) = x(20 - 2x)^2$

D) $V(x) = 400x$

68) A rancher has 1200 feet of fencing to enclose a rectangular pig pen. However, one side of the pen lies along a river and requires no fencing. Express the area of the pen, A, as a function of x. 68) _____



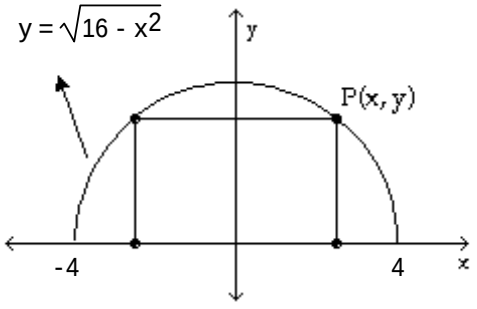
A) $A(x) = x(600 - x)$

B) $A(x) = x\left(\frac{600 - x}{2}\right)$

C) $A(x) = x\left(\frac{1200 - x}{2}\right)$

D) $A(x) = x(1200 - x)$

69) The figure shows a rectangle with two vertices on a semicircle of radius 4 and two vertices on the x-axis. Let P(x, y) be the vertex that lies in the first quadrant. Express the perimeter of the rectangle, P, as a function of x. 69) _____



A) $P(x) = 4x + 2\sqrt{16 - x^2}$

B) $P(x) = 2x + 2\sqrt{16 - x^2}$

C) $P(x) = 2x + \sqrt{16 - x^2}$

D) $P(x) = 2x\sqrt{16 - x^2}$