REVIEW MAC 1105 FINAL

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

1) $|x - 2| = 9$

A) $\{-11\}$ B) $\{7, 11\}$ C) $\{-7, 11\}$ D) $\emptyset$

2) $|8x + 4| + 8 = 15$

F) $\{-\frac{11}{4}, \frac{3}{4}\}$ G) $\left\{-\frac{3}{8}, \frac{11}{8}\right\}$ H) $\left\{-\frac{11}{8}, \frac{3}{8}\right\}$ J) $\emptyset$

Solve the equation.

3) $\frac{x}{2x + 2} = \frac{-2x}{4x + 4} + \frac{2x - 3}{x + 1}$

A) $\left\{\frac{3}{2}\right\}$ B) $\{-3\}$ C) $\{3\}$ D) $\left\{-\frac{12}{5}\right\}$

4) $\frac{m + 4}{m^2 + 3m + 2} - \frac{4}{m^2 + 4m + 4} = \frac{m - 4}{m^2 + 3m + 2}$

F) $\{-12\}$ G) $\{0\}$ H) $\{-3\}$ J) $\{3\}$

Solve the equation.

5) $(2x - 1)^2 = 81$

A) $\{-4, 5\}$ B) $\{-8, 10\}$ C) $\{-5, 4\}$ D) $\{-10, 8\}$

6) $4(x - 2)^2 = 20$

F) $\{2 \pm \sqrt{5}\}$ G) $\{-3, 7\}$ H) $\{-7, 3\}$ J) $\{-2 \pm \sqrt{5}\}$

Solve the radical equation.

7) $\sqrt{26x - 39} = x + 5$

A) $\{8\}$ B) $\{9\}$ C) $\{-8\}$ D) $\{-7\}$

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

F) $\{2, 9\}$ G) $\{9\}$ H) $\{1, 2\}$ J) $\{-1\}$

In solving the following equation by completing the square, what will the equation look like when the square is completed?

9) $x^2 + 12x + 5 = 0$

A) $(x - 6)^2 = 31$ B) $(x + 6)^2 = 31$ C) $(x + 36)^2 = 31$ D) $(x + +6)^2 = 41$

10) $x^2 + 4x - 7 = 0$

F) $(x + 2)^2 = 11$ G) $(x - 2)^2 = 11$ H) $(x - 4)^2 = 11$ J) $(x - 2)^2 = 3$

Solve the polynomial equation.

11) $x^4 - 20x^2 + 64 = 0$

A) $\{-2i, 2i, -4i, 4i\}$ B) $\{-2, 2, -4, 4\}$ C) $\{4, 16\}$ D) $\{2, 4\}$

12) $x^4 - 7x^2 + 12 = 0$

F) $\{-2, 2, -i\sqrt{3}, i\sqrt{3}\}$ G) $\{4, 3\}$ H) $\{2, \sqrt{3}\}$ J) $\{-2, 2, -\sqrt{3}, \sqrt{3}\}$

Solve the polynomial equation.

13) $3x^3 + 4x^2 = 75x + 100$

A) $\left\{-5, -\frac{4}{3}, 5\right\}$ B) $\{-5, 5\}$ C) $\left\{-\frac{4}{3}, 0\right\}$ D) $\left\{-\frac{4}{3}, 5\right\}$

14) $x^3 + 8x^2 - x - 8 = 0$

F) $\{-1, 1, -8\}$ G) $\{-8, 8\}$ H) $\{1, -8, 8\}$ J) $\{64\}$

Solve the equation using the quadratic formula.

15) $x^2 + 5x + 5 = 0$

A) $\left\{\frac{-5 - \sqrt{5}}{2}, \frac{-5 + \sqrt{5}}{2}\right\}$ B) $\left\{\frac{5 - \sqrt{5}}{2}, \frac{5 + \sqrt{5}}{2}\right\}$

C) $\left\{\frac{-5 - 3\sqrt{5}}{2}, \frac{-5 + 3\sqrt{5}}{2}\right\}$ D) $\left\{\frac{-5 - \sqrt{5}}{10}, \frac{-5 + \sqrt{5}}{10}\right\}$

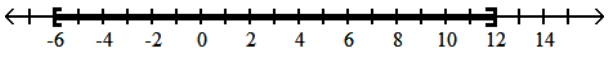
16) $7x^2 + 9x + 4 = 0$

F) $\left\{\frac{9 \pm i\sqrt{31}}{14}\right\}$ G) $\left\{\frac{9 \pm \sqrt{31}}{14}\right\}$ H) $\left\{\frac{-9 \pm i\sqrt{31}}{14}\right\}$ J) $\left\{\frac{-9 \pm \sqrt{31}}{14}\right\}$

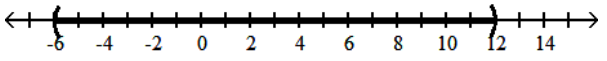
Solve the absolute value inequality. Other than ∅, use interval notation to express the solution set and graph the solution set on a number line.

17) $|x - 3| < 9$

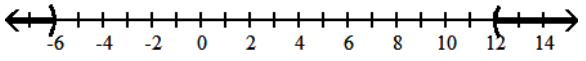
A) $[-6, 12]$



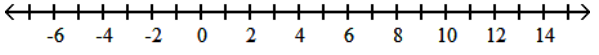
B) $(-6, 12)$



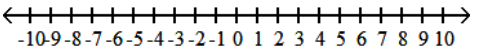
C) $(-\infty, -6) \cup (12, \infty)$



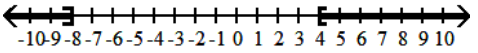
D) ∅



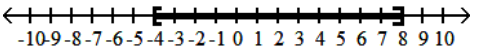
18) $5 + \left|1 - \frac{x}{2}\right| \geq 8$



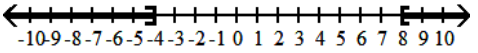
F) $(-\infty, -8] \cup [4, \infty)$



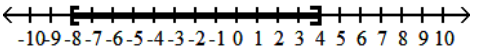
G) $[-4, 8]$



H) $(-\infty, -4] \cup [8, \infty)$

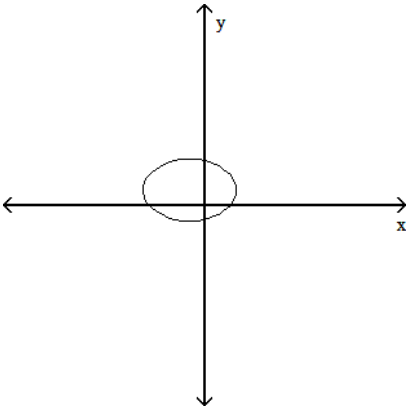


J) $[-8, 4]$



Use the vertical line test to determine whether or not the graph is a graph in which y is a function of x.

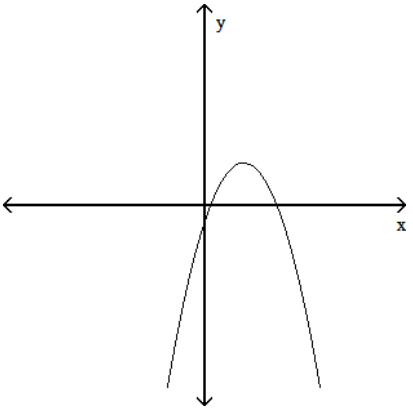
19)



A) function

B) not a function

20)

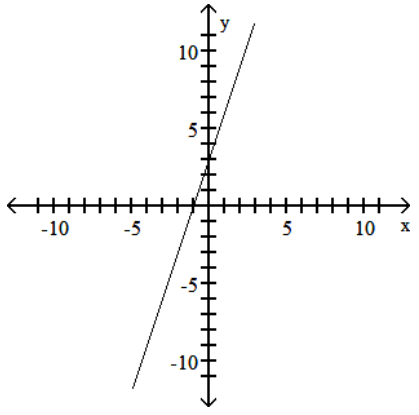


F) function

G) not a function

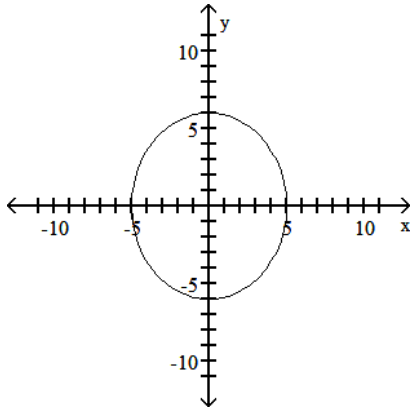
Identify the intercepts.

21)



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

22)

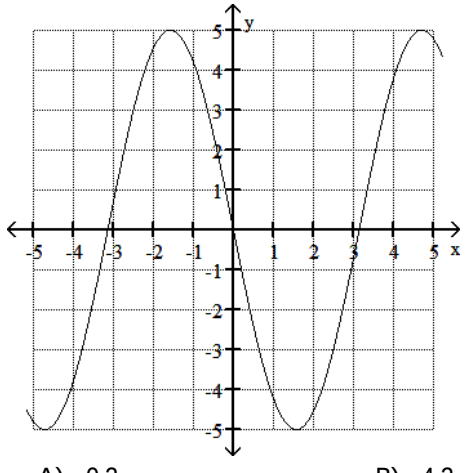


F) (6, 0), (-6, 0), (0, 5), (0, -5) G) (0, 6), (0, -6)

H) (5, 0), (-5, 0) J) (5, 0), (-5, 0), (0, 6), (0, -6)

Use the graph to find the indicated function value.

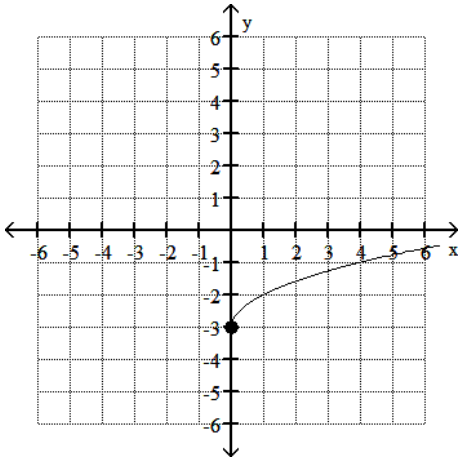
23) y = f(x). Find f(1)



A) -0.2 B) -4.2 C) 4.2 D) 0.2

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

24)



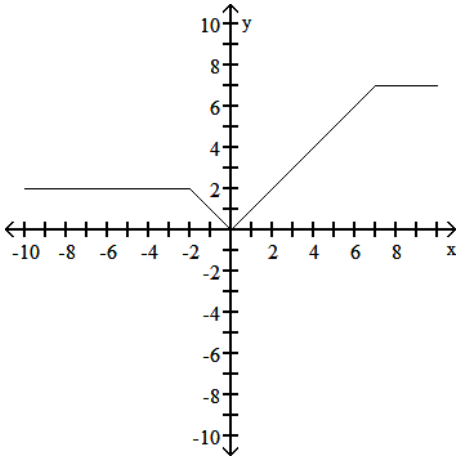
F) domain: $(-\infty, \infty)$
range: $[-3, \infty)$

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

H) domain: $[0, \infty)$
range: $[-3, \infty)$

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

25)



A) domain: $[2, 7]$
range: $(-\infty, \infty)$

B) domain: $(-\infty, \infty)$
range: $[2, 7]$

C) domain: $[0, 7]$
range: $(-\infty, \infty)$

D) domain: $(-\infty, \infty)$
range: $[0, 7]$

Given functions f and g, perform the indicated operations.

26) $f(x) = 4x - 9$, $g(x) = 7x - 3$
Find $f - g$.

F) $-3x - 12$

G) $11x - 12$

H) $-3x - 6$

J) $3x + 6$

27) $f(x) = 6 - 8x$, $g(x) = -4x + 8$
Find $f + g$.

A) $2x$

B) $-12x + 14$

C) $-4x + 14$

D) $-4x + 6$

28) $f(x) = 3x + 3$, $g(x) = 7x - 4$
Find fg.

F) $21x^2 + 17x - 12$

G) $21x^2 - 12$

H) $10x^2 + 9x - 1$

J) $21x^2 + 9x - 12$

29) $f(x) = 8x^2 - 7x$, $g(x) = x^2 - 3x - 28$

Find $\frac{f}{g}$.

A) $\frac{8x}{x + 1}$ B) $\frac{8x - 7}{-3}$ C) $\frac{8x^2 - 7x}{x^2 - 3x - 28}$ D) $\frac{8 - x}{28}$

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

30) $f(x) = -5x + 3$, $g(x) = 6x + 3$

$(g \circ f)(x)$

F) $-30x - 15$ G) $-30x + 21$ H) $-30x + 18$ J) $30x + 21$

31) $f(x) = 5x + 11$, $g(x) = 3x - 1$

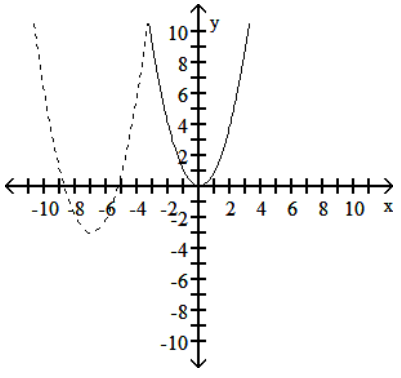
$(f \circ g)(x)$

A) $15x + 10$ B) $15x + 32$ C) $15x + 16$ D) $15x + 6$

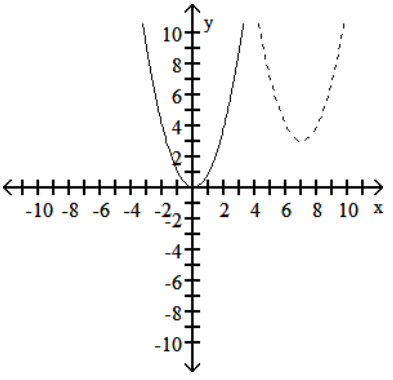
Begin by graphing the standard quadratic function $f(x) = x^2$. Then use transformations of this graph to graph the given function.

32) $h(x) = f(x-7) + 3$

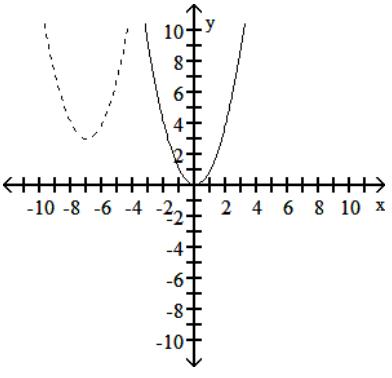
F)



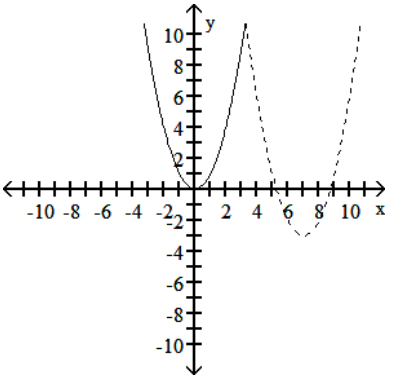
G)



H)



J)



Find the domain of the function.

33) $f(x) = x^2 + 8$

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

34) $g(x) = \dfrac{3x}{x^2 - 49}$

F) $(-\infty, -7) \cup (-7, 7) \cup (7, \infty)$
G) $(-\infty, 0) \cup (0, \infty)$
H) $(-\infty, \infty)$
J) $(49, \infty)$

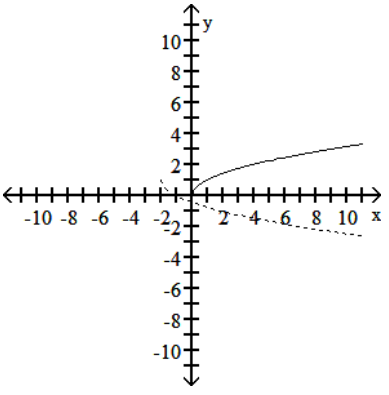
35) $f(x) = \sqrt{21 - x}$

A) $(-\infty, \sqrt{21}) \cup (\sqrt{21}, \infty)$
B) $(-\infty, 21) \cup (21, \infty)$
C) $(-\infty, 21]$
D) $(-\infty, \sqrt{21}]$

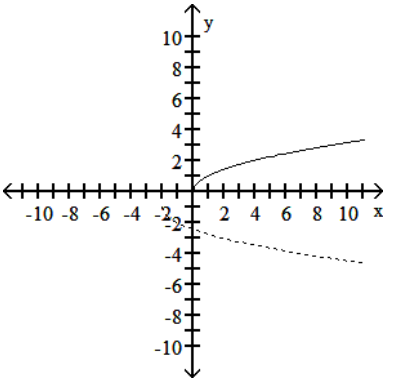
Begin by graphing the standard square root function $f(x) = \sqrt{x}$. Then use transformations of this graph to graph the given function.

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

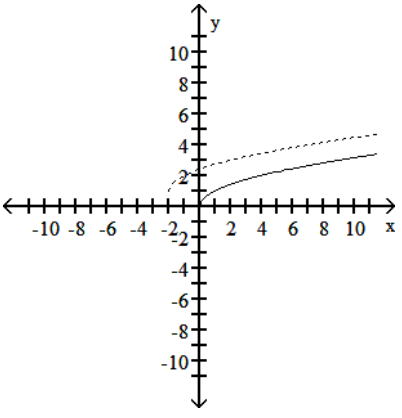
F)



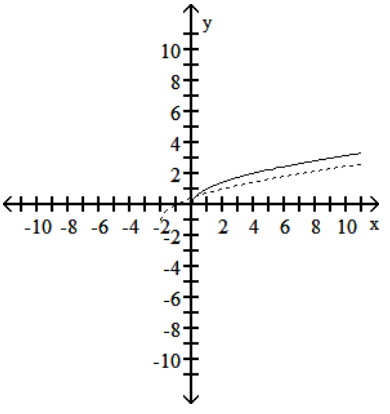
G)



H)



J)



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

37) $h(x) = \dfrac{x + 4}{x(x - 2)}$

A) $x = -4$ and $x = 2$
B) $x = 2$
C) $x = 0$ and $x = 2$
D) no vertical asymptote

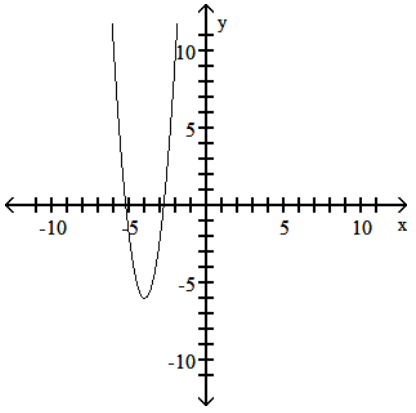
38) $g(x) = \dfrac{x}{x^2 - 36}$

F) $x = 6, x = -6, x = 0$
G) $x = 6, x = -6$
H) $x = 6$
J) no vertical asymptote

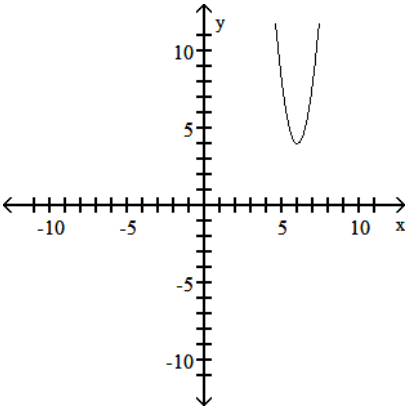
Use the information below to sketch the graph of the quadratic function.

39) A quadratic function with axis of symmetry x = -4 and a minimum value -6.

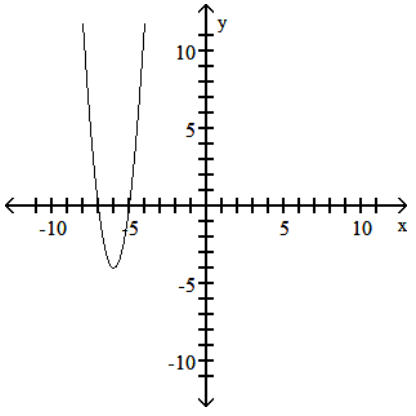
A)



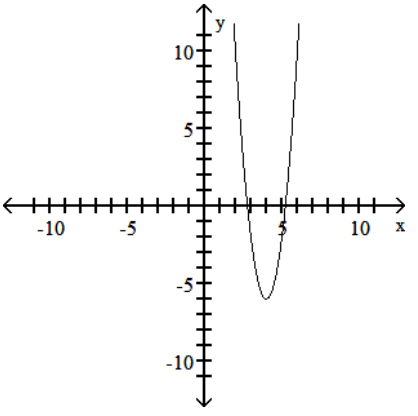
B)



C)



D)



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

40) $f(x) = \frac{-3x - 5}{4x - 4}$

F) $y = \frac{5}{4}$

G) $y = -\frac{3}{4}$

H) $y = -3$

J) no horizontal asymptote

41) $f(x) = \frac{-10x}{2x^3 + x^2 + 1}$

A) $y = -\frac{1}{5}$

B) $y = -5$

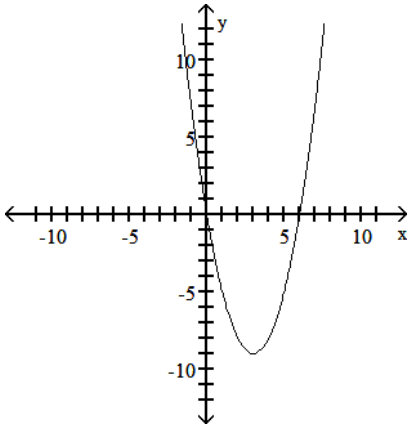
C) $y = 0$

D) no horizontal asymptote

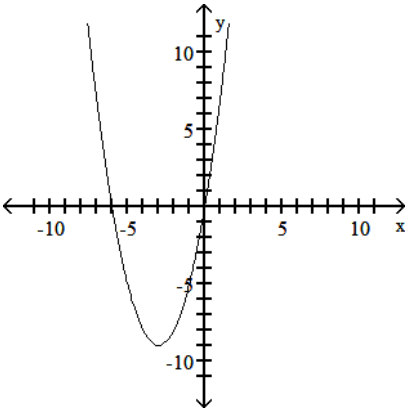
Use the information below to sketch the graph of the quadratic function.

42) A quadratic function with axis of symmetry x = -3 and a maximum value 9.

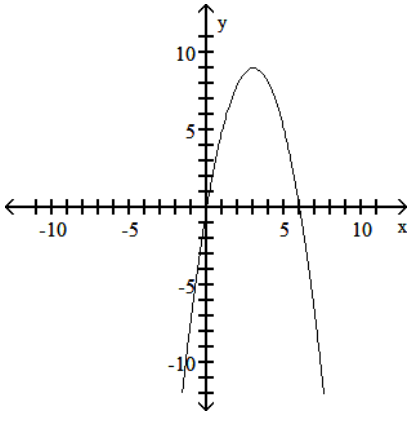
F)



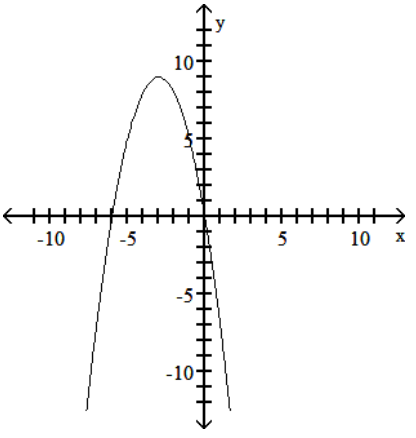
G)



H)



J)



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

43) $h(x) = \frac{12x^3}{3x^2 + 1}$

A) $y = \frac{1}{4}$

B) $y = 0$

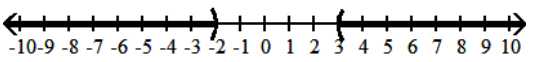
C) $y = 4$

D) no horizontal asymptote

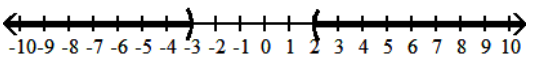
Solve the polynomial inequality and graph the solution set on a number line. Express the solution set in interval notation.

44) $(x - 3)(x + 2) > 0$

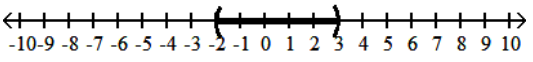
F) $(-\infty, -2) \cup (3, \infty)$



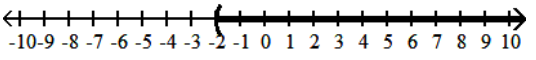
G) $(-\infty, -3) \cup (2, \infty)$



H) $(-2, 3)$

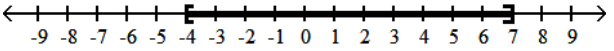


J) $(-2, \infty)$

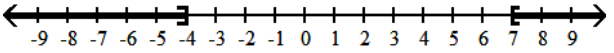


45) $x^2 - 3x - 28 \leq 0$

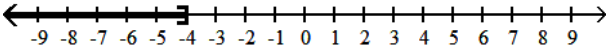
A) $[-4, 7]$



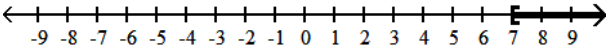
B) $(-\infty, -4] \cup [7, \infty)$



C) $(-\infty, -4]$



D) $[7, \infty)$



Solve the system of equations.

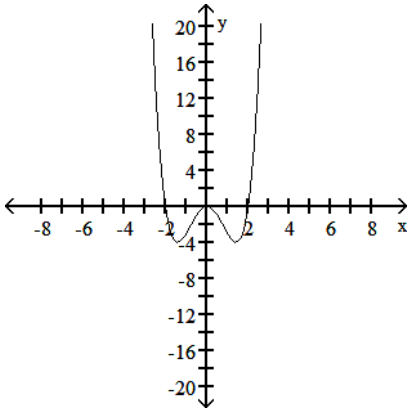
46) $x + y + z = -6$
$x - y + 4z = 6$
$5x + y + z = -26$

F) $\{(-5, -3, 2)\}$ G) $\{(-3, -5, 2)\}$ H) $\{(2, -3, -5)\}$ J) $\{(2, -5, -3)\}$

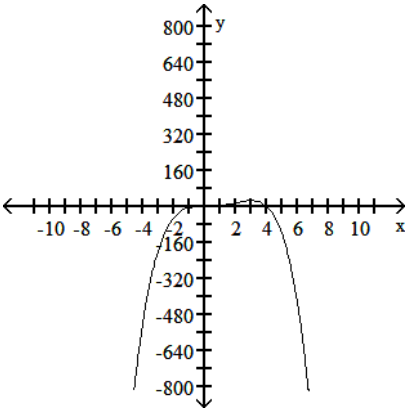
Use the Leading Coefficient Test to determine the end behavior of the polynomial function. Then use this to match the function with its graph.

47) f(x) is a polynomial function with degree 4 and leading coefficient a = 1.

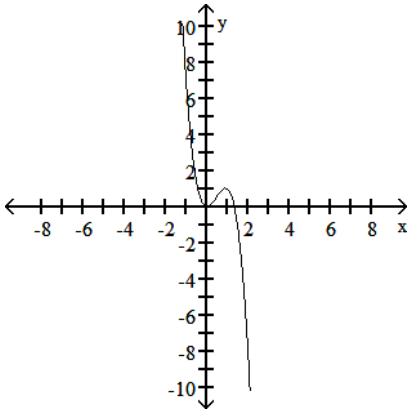
A)



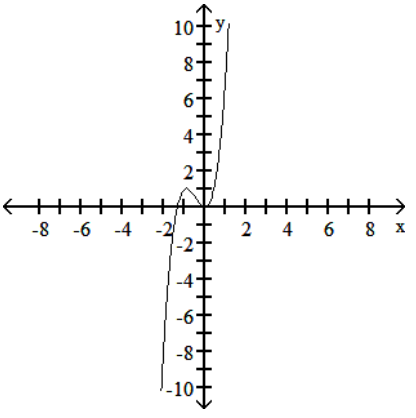
B)



C)

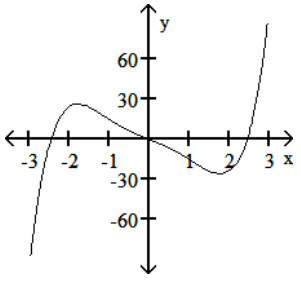


D)

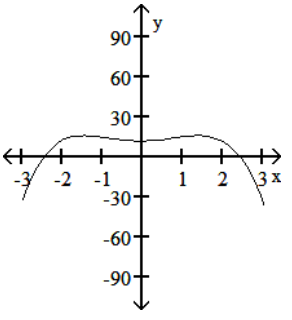


48) f(x) is a polynomial function with degree 5 and leading coefficient a = 3.

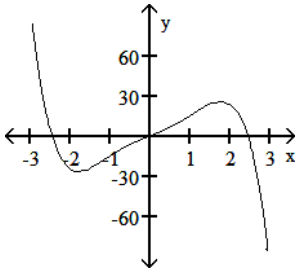
F)



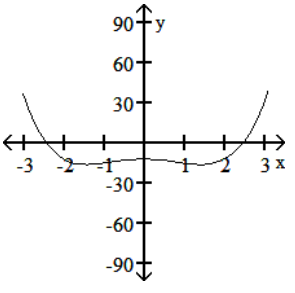
G)



H)



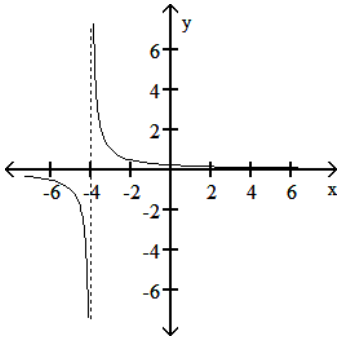
J)



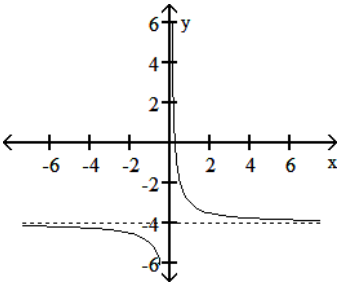
Use transformations of $f(x) = \frac{1}{x}$ or $f(x) = \frac{1}{x^2}$ to graph the rational function.

49) $h(x) = \frac{1}{x - 4}$

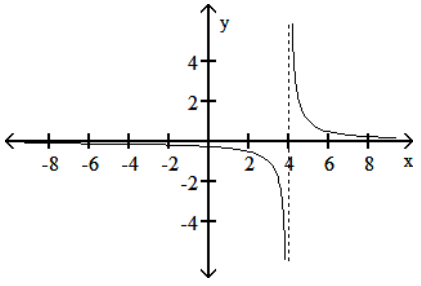
A)



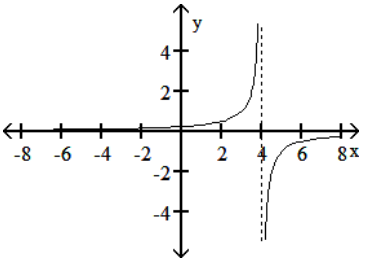
B)



C)

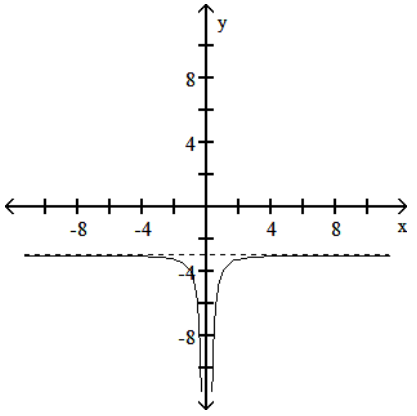


D)

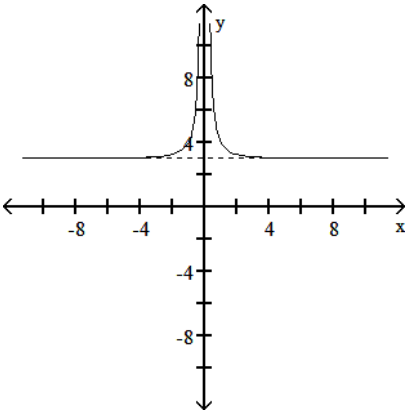


50) $f(x) = \frac{1}{x^2} - 3$

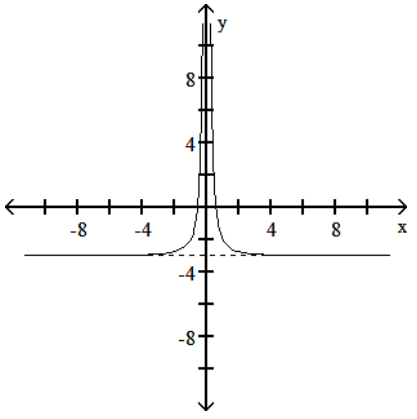
F)



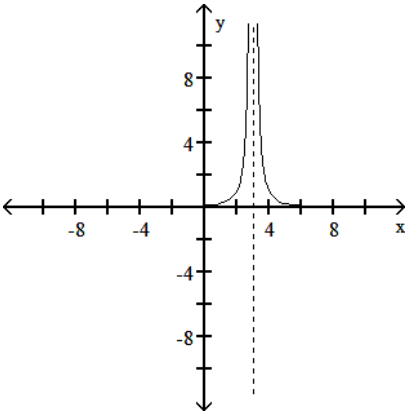
G)



H)



J)



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.

51) $\log_5 (x - 1) = -2$

A) $\left\{-\frac{3}{4}\right\}$ B) $\left\{\frac{13}{16}\right\}$ C) $\left\{\frac{26}{25}\right\}$ D) $\left\{-\frac{24}{25}\right\}$

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

F) {6, -4} G) {-4} H) {6} J) {7}

Solve the equation by expressing each side as a power of the same base and then equating exponents.

53) $2^{(7 - 3x)} = \frac{1}{4}$

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

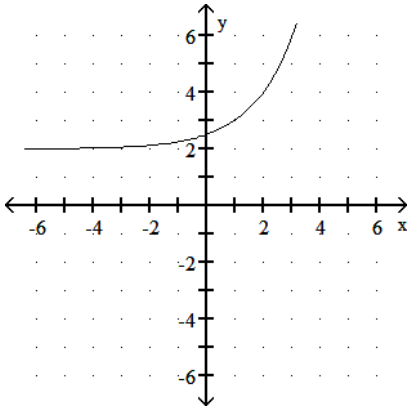
54) $3^{(1 + 2x)} = 27$

F) {9} G) {3} H) {1} J) {-1}

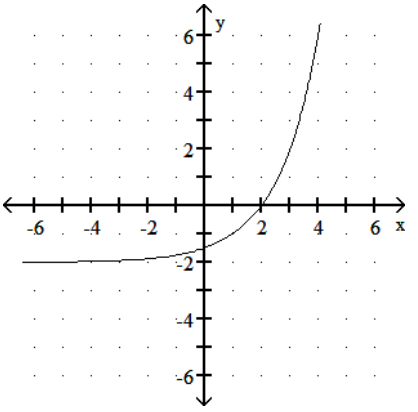
Graph the function.

55) Which graph best matches the exponential function $g(x) = a^{x+1} + 2$, where $a > 1$?

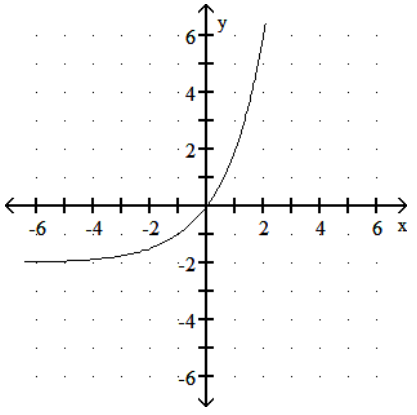
A)



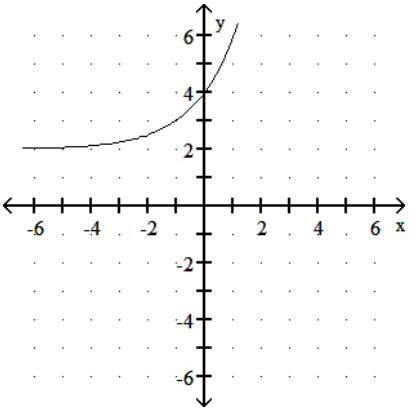
B)



C)

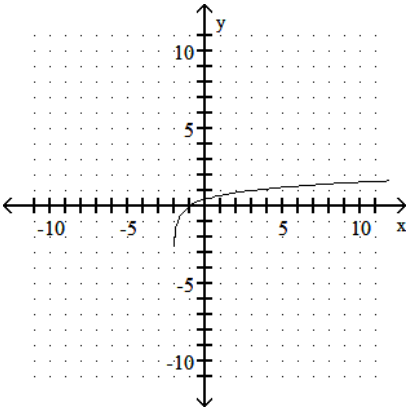


D)



The graph of a logarithmic function is given. Select the function for the graph from the options.

56)

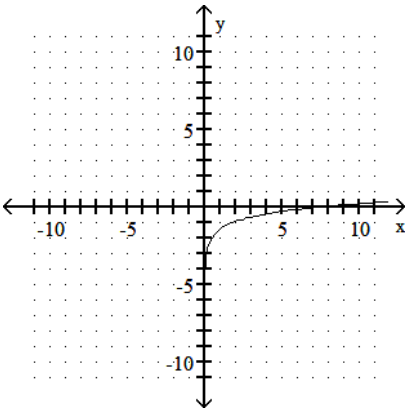


F) $f(x) = \log_5 (x - 2)$ G) $f(x) = \log_5 x + 2$ H) $f(x) = \log_5 (x + 2)$ J) $f(x) = \log_5 x$

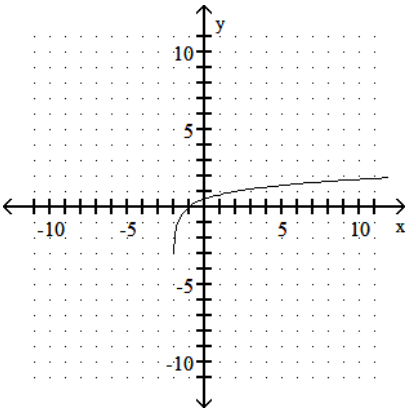
Graph the function.

57) Use the graph of $\log_4 x$ to obtain the graph of $f(x) = \log_4 (x - 2)$.

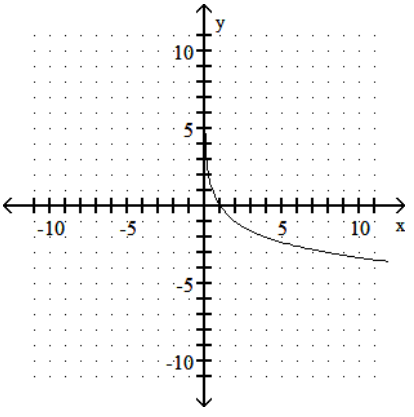
A)



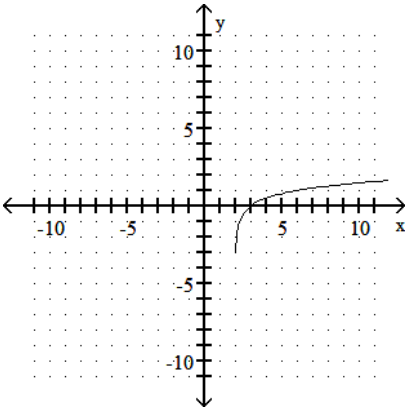
B)



C)



D)



Solve.

58) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 3800e^{0.049t}$. How much did you initially invest in the account?

F) \$3800.00 G) \$1900.00 H) \$186.20 J) \$3990.84

59) The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $A = 6200e^{0.057t}$. When will the account be worth \$8728?

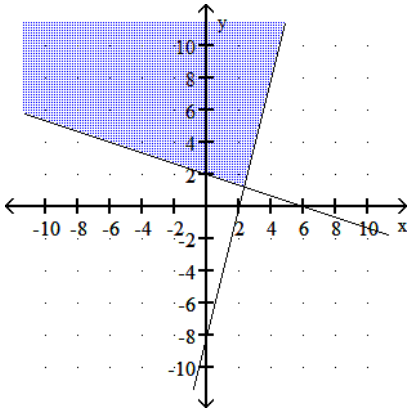
A) 2007 B) 2008 C) 2006 D) 2005

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

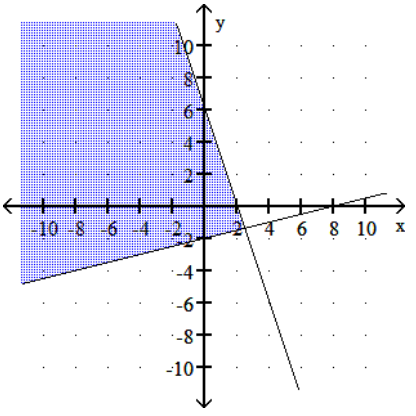
60) $4x - y \le 8$

$x + 3y \ge 6$

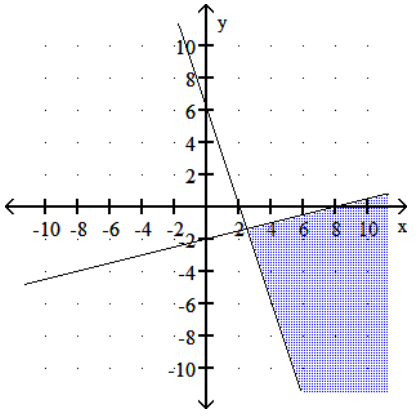
F)



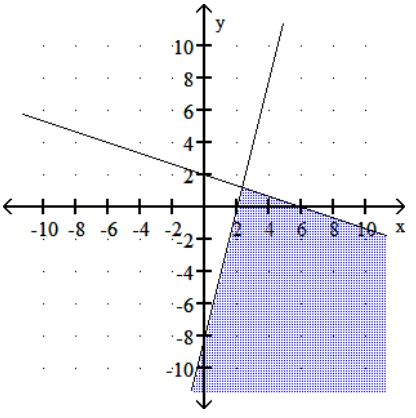
G)



H)

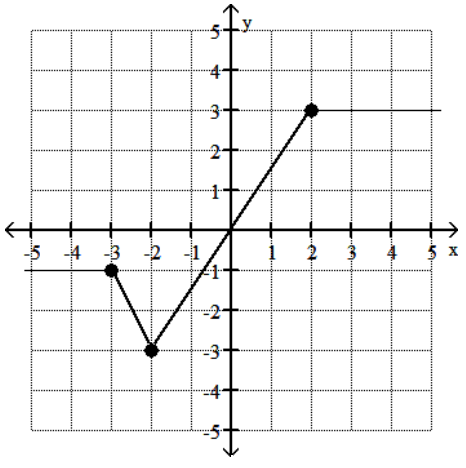


J)



Identify the intervals where the function is changing as requested.

61) Increasing



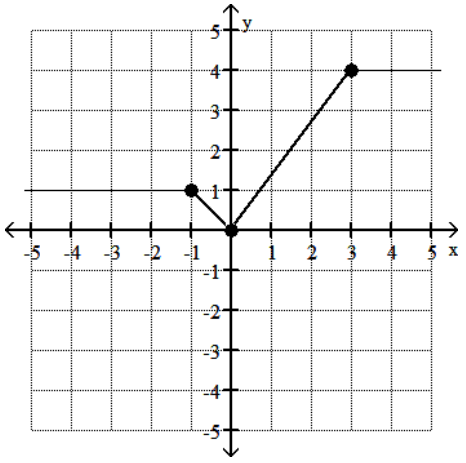
A) (-2, 2)

B) (-3, 3)

C) (-2, ∞)

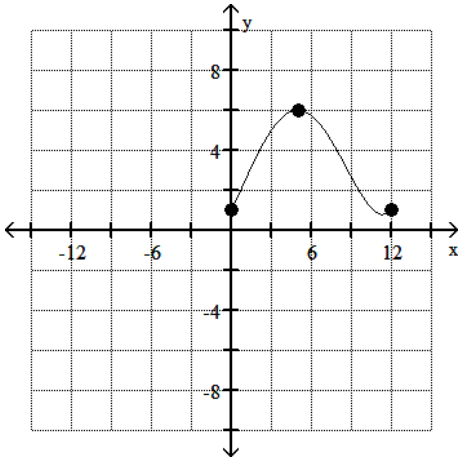
D) (-3, ∞)

62) Constant



F) $(-\infty, -1)$ or $(3, \infty)$ G) $(-1, 0)$ H) $(3, \infty)$ J) $(-\infty, 0)$

63) Decreasing

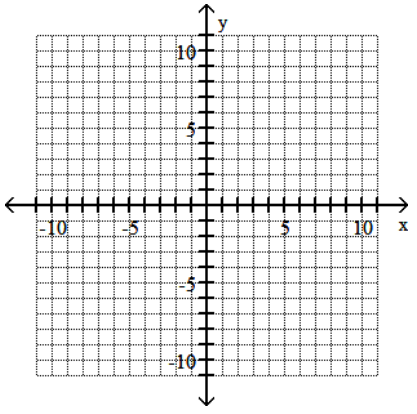


A) (5, 12) B) (6, 1) C) (5, 1) D) (6, 12)

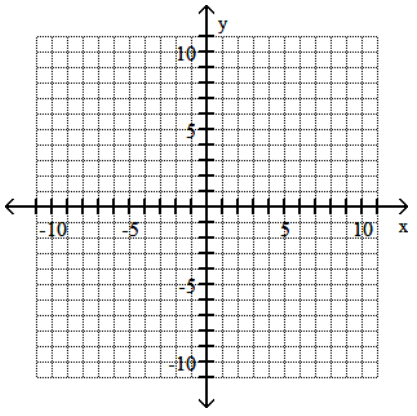
For problems 63 and 64.

a. State domain b. State range c. State the vertex d. State axis of symmetry e. State all intercepts f. Graph

64) $f(x) = x^2 + 6x + 5$



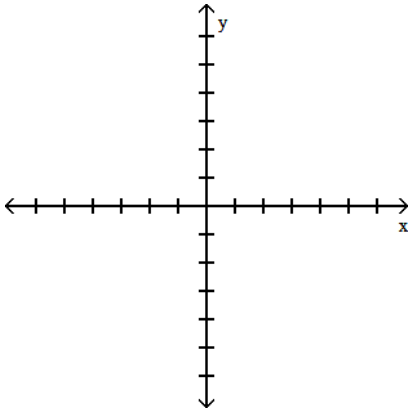
65) $f(x) = -x^2 - 4x + 5$



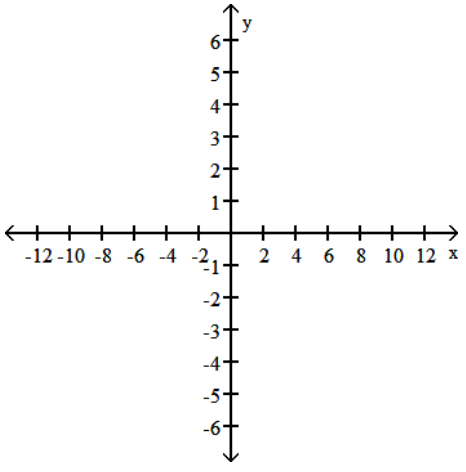
For problems 65 and 66:

a. State intercepts b. State asymptotes c. Graph

66) $f(x) = \dfrac{x^2 + 3x - 10}{x^2 - 2}$



67) $f(x) = \dfrac{x - 2}{x^2 - x - 30}$



68) Find the balance of an investment of $20,000 at 12% compounded annually for 5 years.

69) Find the balance of an investment of $2000 at 8% compounded semiannually for 9 years.

70) Find the balance of an investment of $5000 at 9% compounded continuously for 6 years.

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

71) $2^{x+8} = 3$

72) $4^{x+4} = 5^{2x+5}$

Solve the system of equations.

73)
$$\begin{aligned} x + y + z &= 6 \\ x - y + 2z &= 4 \\ 3x + y + z &= 4 \end{aligned}$$

74)
$$\begin{aligned} 5x + 2y + z &= -25 \\ 5x - 3y - z &= -23 \\ 3x + y + 2z &= -9 \end{aligned}$$

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

75) $f(x) = -4x + 7$

76) $f(x) = \dfrac{8x - 5}{3}$

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

77)
$$f(x) = \begin{cases} -5x + 4 & \text{if } x < -3 \\ 2x + 3 & \text{if } x \geq -3 \end{cases}$$

Determine $f(-7)$.

78)
$$f(x) = \begin{cases} -4x - 3 & \text{if } x < -1 \\ 5x + 4 & \text{if } x \geq -1 \end{cases}$$

Determine $f(1)$.

Solve the problem.

79) You have 236 feet of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area.

80) You have 108 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area.

81) A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 336 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed?

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.

82) $\log_5 (x + 2) - \log_5 x = 2$

83) $\log_3 (x + 6) + \log_3 (x - 6) = \log_3 x + 2$

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

84) $f(x) = x^3 - 4x$

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

86) $f(x) = x^3 + x + 4$

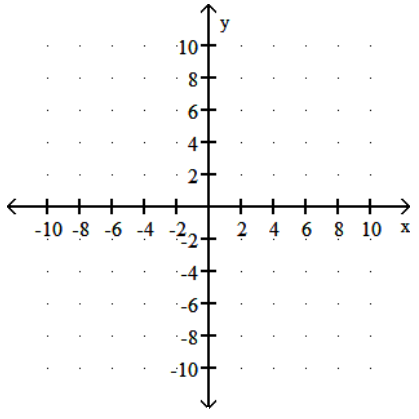
Determine algebraically whether the function is even, odd, or neither.

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

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

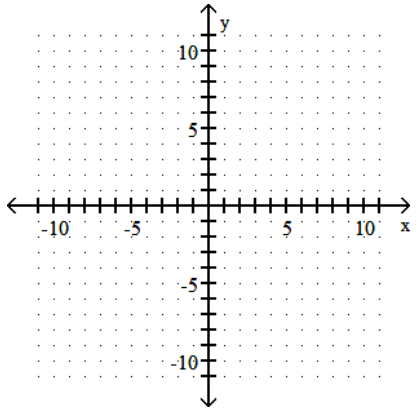
88) $2x - y \le -6$

$x + 2y \ge -2$



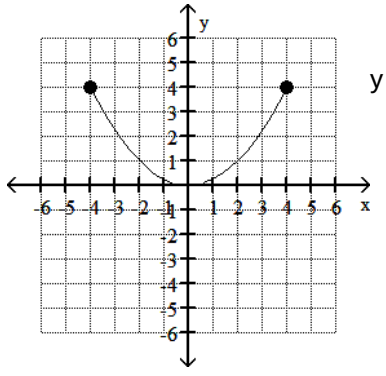
89) $y < x + 1$

$2x + 7y > -14$

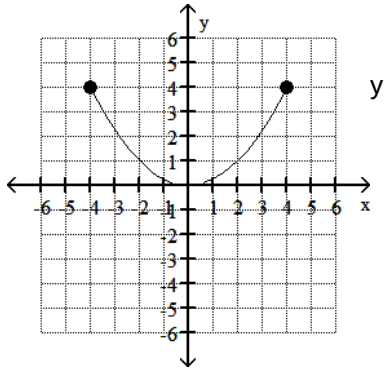


Use the graph of the function f, plotted with a solid line, to sketch the graph of the given function g.

90) $g(x) = f(x - 1) - 2$

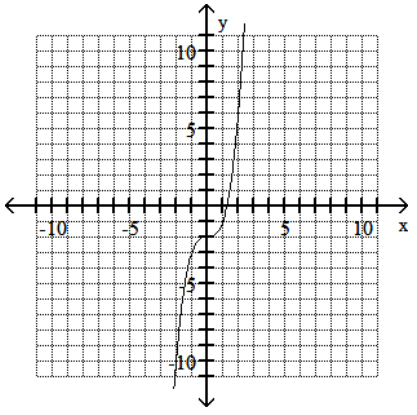


91) $g(x) = -f(x - 1) + 2$

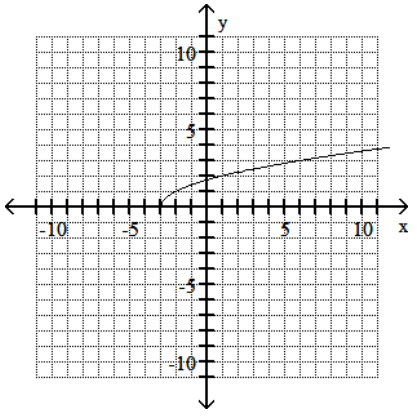


Use the graph of f to draw the graph of its inverse function.

92)



93)



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

94) $\frac{x - 2}{x + 1} < 0$

95) $\frac{-x + 3}{x - 1} \geq 0$

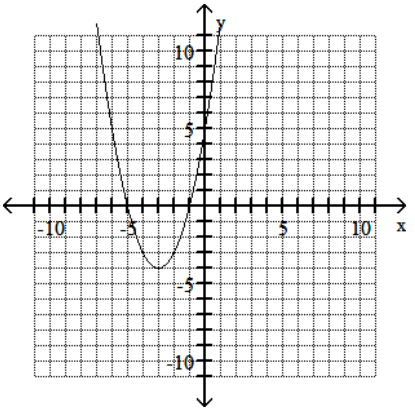
Find the zeros for the polynomial function and give the multiplicity for each zero. State whether the graph crosses the x-axis or touches the x-axis and turns around, at each zero.

96) $f(x) = 4(x - 2)(x + 1)^4$

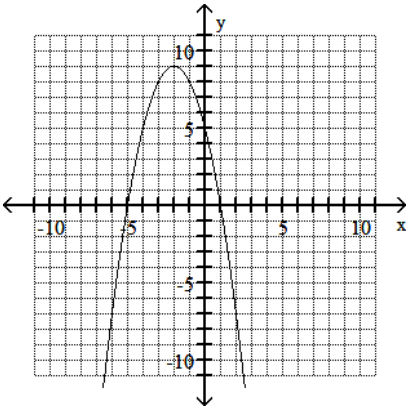
97) $f(x) = 5(x^2 + 1)(x - 4)^2$

1) C
2) H
3) C
4) H
5) A
6) F
7) A
8) G
9) B
10) F
11) B
12) J
13) A
14) F
15) A
16) H
17) B
18) H
19) B
20) F
21) C
22) J
23) B
24) H
25) D
26) H
27) B
28) J
29) C
30) G
31) D
32) G
33) D
34) F
35) C
36) G
37) C
38) G
39) A
40) G
41) C
42) J
43) D
44) F
45) A
46) F
47) A
48) F
49) C
50) H

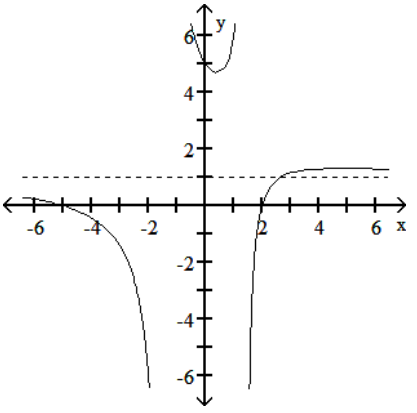
51) C
52) H
53) B
54) H
55) D
56) H
57) D
58) F
59) C
60) F
61) A
62) F
63) A
64)



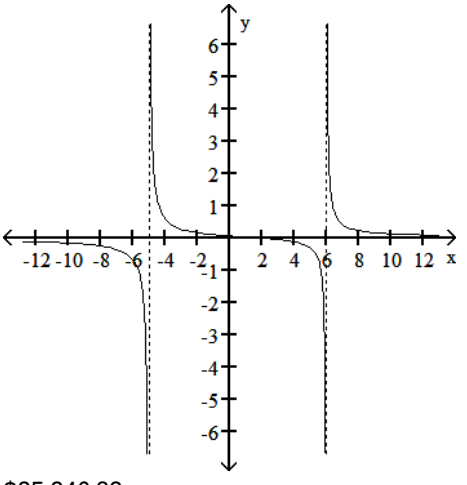
65)



66)

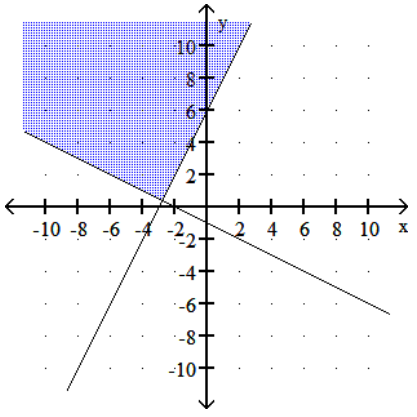


67)

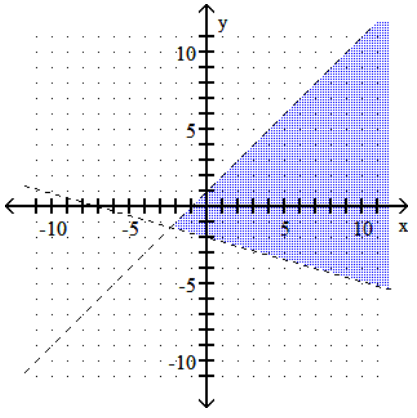


68) $35,246.83
69) $4051.63
70) $8580.03
71) $\left\{\frac{\ln 3}{\ln 2} - 8\right\}$
72) $\left\{\frac{5 \ln 5 - 4 \ln 4}{\ln 4 - 2 \ln 5}\right\}$
73) {(-1, 3, 4)}
74) {(-5, -2, 4)}
75) $f^{-1}(x) = \frac{x - 7}{-4}$
76) $f^{-1}(x) = \frac{3x + 5}{8}$
77) 39
78) 9
79) 59 ft by 59 ft
80) length: 54 feet, width: 27 feet
81) 14,112 ft^2
82) $\{\frac{1}{12}\}$

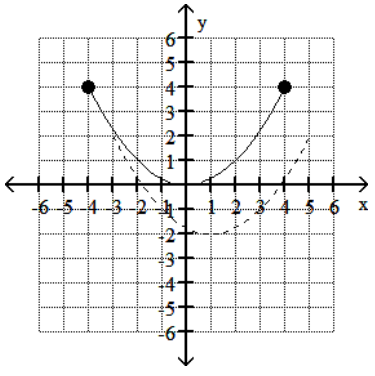
83) {12}
84) Odd
85) Even
86) Neither
87) odd
88)



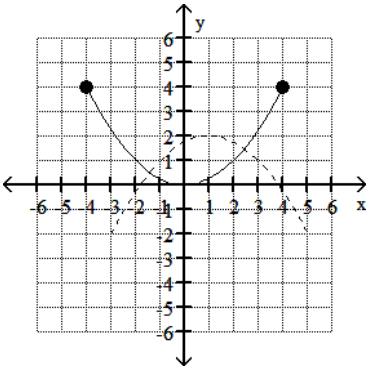
89)



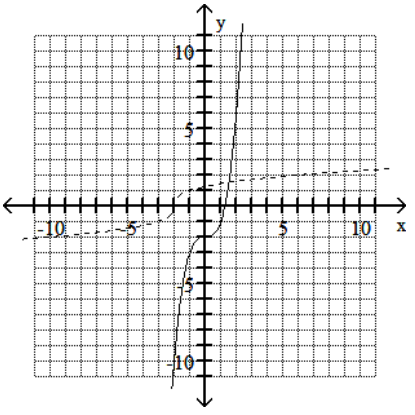
90)



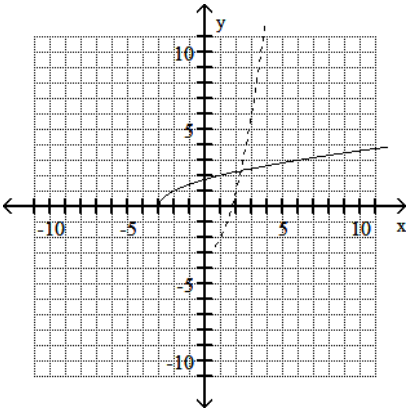
91)



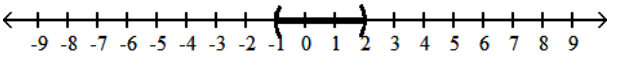
92)



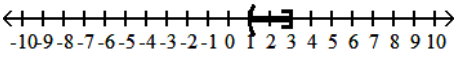
93)



94) (-1, 2)



95) (1, 3]



96) 2, multiplicity 1, crosses x-axis;
-1, multiplicity 4, touches
x-axis and turns around
97) 4, multiplicity 2, touches the
x-axis and turns around