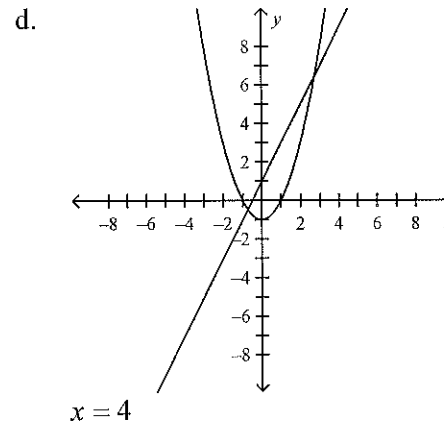
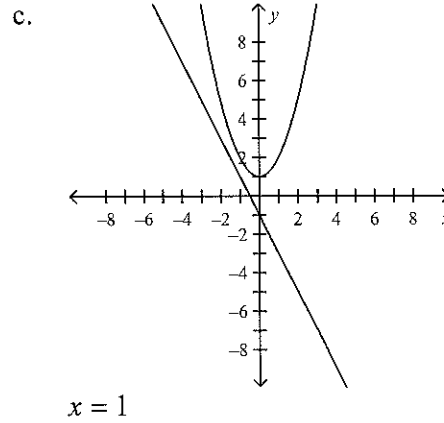
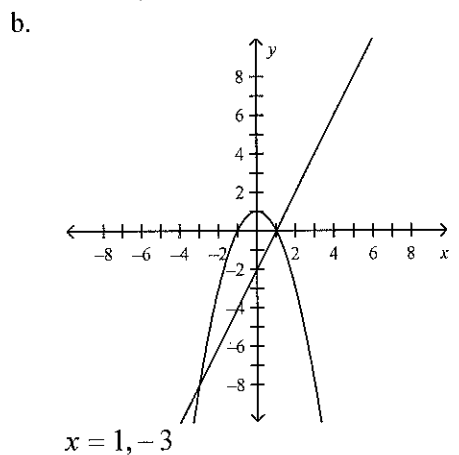
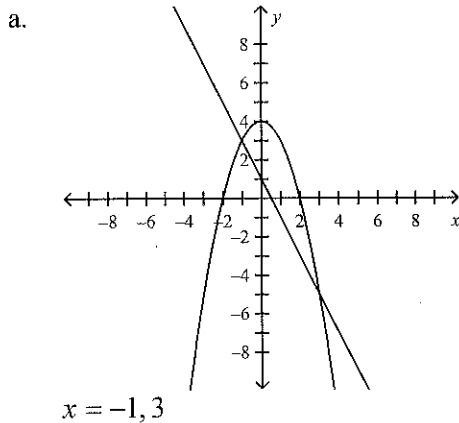


**Pre-Calculus Exam Review**

**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

\_\_\_\_\_ 1. Use the intersect method to solve the equation  $-2x + 1 = -x^2 + 4$ .



\_\_\_\_\_ 2. Solve by completing the square:

$x^2 + 2x - 3 = 0$

- a.  $x = 3$  or  $-1$
- b.  $x = 3$  or  $1$

- c.  $x = -3$  or  $1$
- d.  $x = -3$  or  $-1$

\_\_\_\_\_ 3. Solve by taking the square root of both sides.

$4(x - 2)^2 - 252 = 0$

- a.  $x = 2 - 9\sqrt{7}$  or  $2 + 9\sqrt{7}$
- b.  $x = -2 - 3\sqrt{7}$  or  $-2 + 3\sqrt{7}$

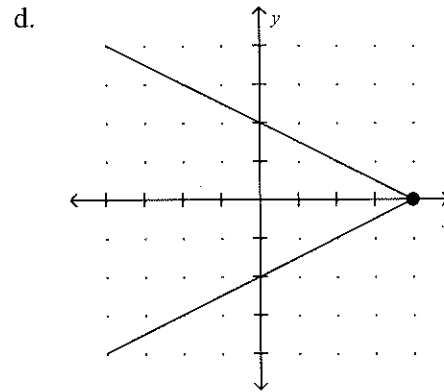
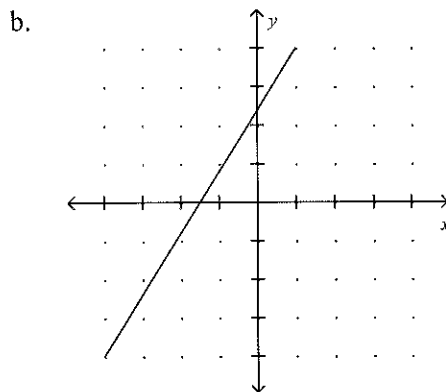
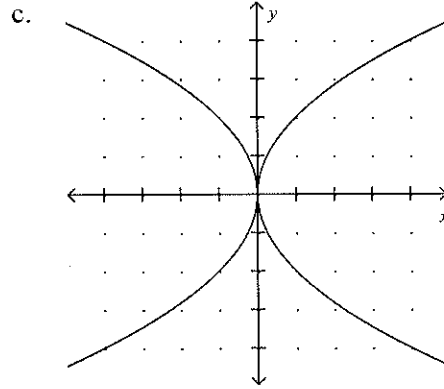
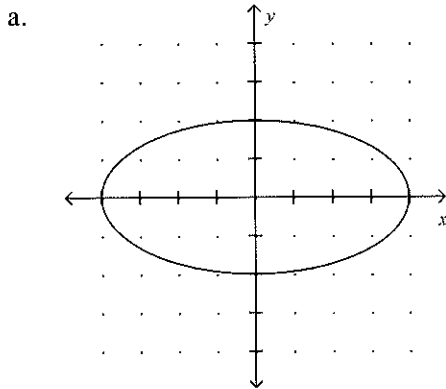
- c.  $x = -2 - 3\sqrt{7}$  or  $2 + 3\sqrt{7}$
- d.  $x = 2 - 3\sqrt{7}$  or  $2 + 3\sqrt{7}$

\_\_\_\_\_ 4. Determine the nature of the roots:  $3x^2 + 4x + 4 = 0$

- a. no real solutions
- b. two distinct real solutions
- c. cannot be determined
- d. a unique real solution

5. Find all real solutions of the equation  $\left| \frac{7}{3}x + 3 \right| + 7 = 11$ .
- a.  $\frac{7}{3}$  or  $-9$                       c.  $\frac{3}{7}$  or  $-3$
- b.  $9$  or  $3$                               d.  $3$  or  $-\frac{49}{3}$
6. Find all real solutions of the equation  $|x^2 - 6x + 1| = 8$ .
- a.  $x = -1, 3, \text{ or } 7$                       c.  $x = -1, 0, \text{ or } 3$
- b.  $x = -1, 0, \text{ or } 6$                       d.  $x = -1, 0, \text{ or } 9$
7. Find all real solutions of the equation  $\sqrt{x^2 - 12x + 84} = 7$ .
- a.  $x = 5 \text{ or } 7$                               c.  $x = -7 \text{ or } -5$
- b.  $x = 5 \text{ or } -7$                               d.  $x = -5 \text{ or } 7$
8. Find all real solutions of the equation  $\sqrt[3]{4x - 3} + 2 = 9$ .
- a.  $\frac{7}{4}$     c.  $\frac{173}{2}$
- b.  $-\frac{7}{3}$     d.  $13$
9. Find all real solutions of the equation  $0 = \frac{x^2 - 5x - 6}{x + 1}$ .
- a.  $x = 6 \text{ or } -7$                               c.  $x = -6$
- b.  $x = 6$     d.  $x = 6 \text{ or } 7$
10. Which of the following represents  $1 < x \leq 6$ ?
- a.  $[1, 6]$     c.  $(1, 6)$
- b.  $(1, 6]$     d.  $[1, 6)$
11. Solve the inequality and express your answer in interval notation.  
 $-10 \leq -2x + 6 \leq -2$
- a.  $[-4, 9]$     c.  $[-4, 8]$
- b.  $[4, 9]$     d.  $[4, 8]$
12. Solve the inequality and express your answer in interval notation.  
 $x^2 + 8x + 3 < 0$
- a.  $(-4 - \sqrt{13}, -4 + \sqrt{13})$                       c.  $[-4 - \sqrt{13}, -4 + \sqrt{13}]$
- b.  $(-\infty, -4 - \sqrt{13}) \text{ or } (-4 + \sqrt{13}, \infty)$                       d.  $(-\infty, -4 - \sqrt{13}] \text{ or } [-4 + \sqrt{13}, \infty)$
13. Which of the following is *not* a function given that  $x$  is an independent variable?
- a.  $y = 6\sqrt{x}, x \geq 0$                               c.  $y = 6x^2 - 4$
- b.  $\{(6, 4), (-2, 1), (10, -1)\}$                       d.  $x = 6y^2 - 4$

14. Use the Vertical Line Test to determine which graph defines a function.



15. Which function is in quadratic polynomial form?

a.  $f(x) = x^2 + 10 + x^3$

c.  $f(x) = \left(\frac{1}{x+5}\right)^2$

b.  $f(x) = x^2 + 10x + 25$

d.  $f(x) = x^2 + 10x + 25 + x^3$

16. Which is the function  $f(x) = x^2 + 8x + 19$  in transformation form?

a.  $f(x) = (x+4)^2 + 3$

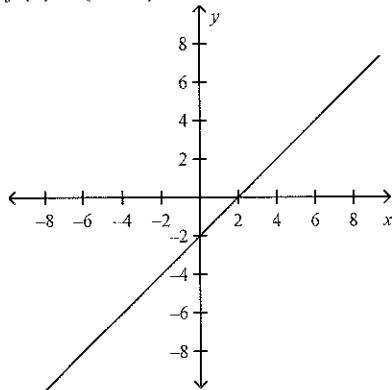
c.  $f(x) = (x+1)^2 + 3$

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

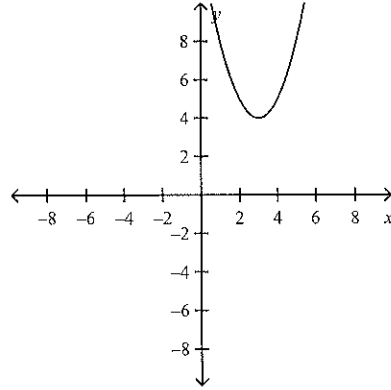
d.  $f(x) = (x+4)^2 + 1$

17. Find the rule and the graph of the function whose graph can be obtained by performing the translation 3 units right and 4 units up on the parent function  $f(x) = x^2$ .

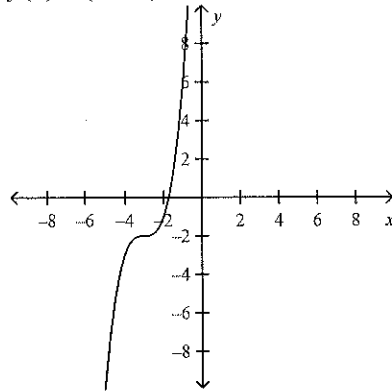
a.  $f(x) = (x - 5)^2 + 4$



c.  $f(x) = (x - 3)^2 + 4$



b.  $f(x) = (x + 3)^2 + 2$



d. None of these

18. Given  $f(x) = x^3$  and  $g(x) = 1 - 5x^2$ , find  $(f \circ g)(x)$  and its domain.

a.  $(1 - 5x^3), x \neq \sqrt[3]{-3}$

b.  $(1 - 5x^2)^3$ , all real numbers

c.  $(1 - 5x^3), x \neq \sqrt[3]{-\frac{3}{5}}$

d. None of these

19. Which is the quotient and remainder found when dividing  $9x^3 + 3x^2 - 21x - 7$  by  $3x + 4$ ?

a. Quotient  $3x^2 - 3x - 2$ ; remainder 1

c. Quotient  $3x^2 + 3x + 3$ ; remainder 5

b. Quotient  $3x^2 + 3x + 2$ ; remainder 1

d. Quotient  $3x^2 - 3x - 3$ ; remainder 5

20. Determine the maximum number of zeros of the polynomial function

$-9x^2 + 2x + 2$ .

a. 3

c. 1

b. 2

d. 4

21. Determine the domain of the function  $f(x) = \frac{x^2 - 9x + 14}{x^2 + 10x + 21}$ .

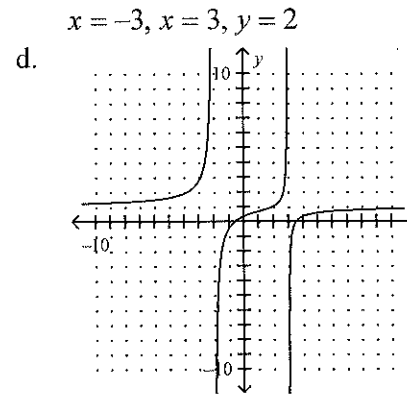
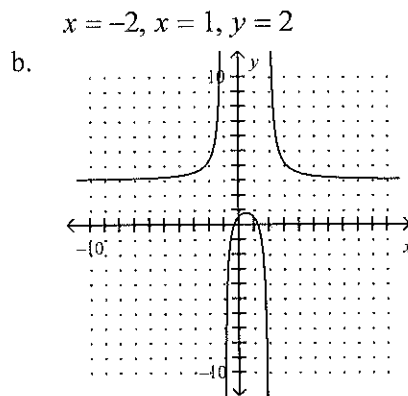
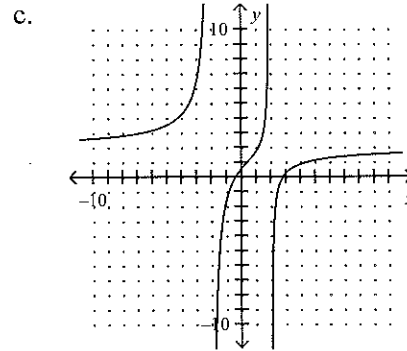
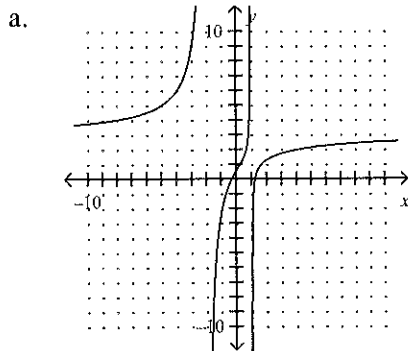
a. All real numbers except 2 and 7

c. All real numbers except -7 and -3

b. All real numbers except -2 and -7

d. All real numbers except 7 and 3

22. Which shows the graph and lists the asymptotes of the rational function  $f(x) = \frac{3x^2 - 3x - 1}{x^2 - x - 2}$ ?



$x = -1, x = 2, y = 3$

$x = -2, x = 2, y = 3$

**Short Answer**

23. Use the  $x$ -intercept method to find all real solutions of the equation.  
 $14x^3 - 53x^2 + 41x - 4 = -4x^3 + x^2 + 1x + 4$
24. If an object is dropped from a height of 37 feet, the function  $d = -16t^2 + 37$  gives the height of the object after  $t$  seconds. Graph this function. Approximately how long does it take the object to reach the ground ( $d = 0$ )?
25. Solve by factoring:  
 $25x^2 + 5x - 12 = 0$
26. Solve the equation.  
 $2x^2 - 1 = 5x$
27. The simple interest  $I$  on an investment of  $P$  dollars at an interest rate  $r$  for  $t$  years is given by  $I = Prt$ . Find the time it would take to earn \$1400 in interest on an investment of \$27,000 at a rate of 4.2%.
28. The perimeter of a rectangular concrete slab is 52 feet and its area is 165 square feet. What is the length of the longer side of the slab?
29. Find all real solutions of the equation  $\sqrt{x+9} + \sqrt{x} = 5$ .
30. Find all real solutions of the equation  $\frac{-4x^2 - 13x - 3}{x^2 - 4x - 3} = 0$ .

31. Solve the inequality and express your answer in interval notation.

$$7x - 10 \leq 8x + 2$$

32. Solve the inequality and express your answer in interval notation.

$$\frac{(x-5)(x+6)}{(x-3)} \geq 0$$

33. An arrow shot into the air is
- $160t - 16t^2$
- feet above the ground
- $t$
- seconds after it is released. During what period of time is the arrow above 384 feet?

34. Determine the domain of the function.

$$y = \sqrt{x+4} + 2$$

35. Find the indicated values of the function.

$$f(x) = [x] - 3x$$

a.  $f(2.1)$     b.  $f(-0.3)$     c.  $f(-5.8)$

36. Determine the vertex and
- $y$
- intercept of the function and sketch a graph.

$$f(x) = 3(x+2)^2 + 1$$

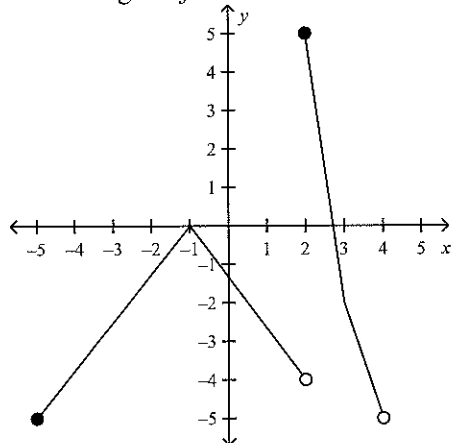
37. Identify the parent function that can be used to graph the function
- $f(x) = 3(x-9)^2$
- . Do not graph the function.

38. Find the inverse of
- $f(x) = 7x^2$
- . Determine if the inverse is a function.

39. The graph below defines a function
- $f$
- . Determine the following:

a.  $f(3)$

b.  $f(2)$

c. the domain of  $f$ d. the range of  $f$ 

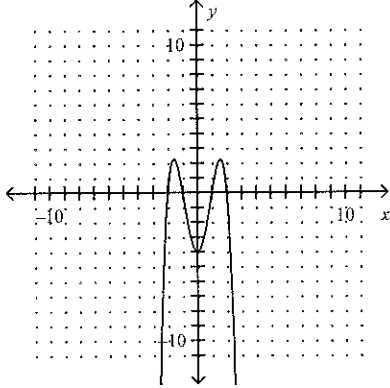
40. Use the Factor Theorem to determine which of the following are factors of
- $3x^4 + x^3 - 63x^2 + 39x + 20$
- .

$$x-4, x + \frac{1}{3}, x+5, x+4$$

41. Find all real zeros of the following polynomial function.

$$f(x) = x^4 + 2x^3 - 18x^2 - 6x + 45$$

42. A complete graph of a polynomial function  $g$  is shown below.
- Is the degree of  $g(x)$  even or odd?
  - Is the leading coefficient of  $g(x)$  positive or negative?
  - What do the real zeros of  $g(x)$  appear to be?
  - What is the smallest possible degree of  $g(x)$ ?



43. For the polynomial,  $(x - 2)(x - 3)^2(x - 4)^3$ ,
- Find the  $x$ - and  $y$ -intercepts of the graph of  $f$ .
  - Determine whether the graph crosses or touches the  $x$ -axis at each  $x$ -intercept.
  - End behavior: find the function that the graph of  $f$  resembles for large values of  $x$ .
  - Determine the maximum number of extrema on the graph of  $f$ .
  - Use the  $x$ -intercepts and test numbers to find the intervals on which the graph is above the  $x$ -axis and the intervals on which the graph is below the  $x$ -axis.
  - Put all the information together, and connect the points with a smooth, continuous curve to obtain the graph of  $f$ .

44. Use algebra to find the holes in the graph of  $f(x) = \frac{2x^2 - 5x - 12}{2x^2 - 3x - 20}$ .

45. Describe the end behavior of  $f(x) = \frac{-x^2}{x^2 + 4x + 5}$ .

46. Find the indicated values of the function.

$$f(x) = \begin{cases} \frac{2}{5}x & \text{if } x > 3 \\ 1 + 6x & \text{if } x \leq 3 \end{cases}$$

- $f(3)$
- $f(0)$
- $f(5)$
- $f(2.7)$

## Pre-Calculus Exam Review

### Answer Section

#### MULTIPLE CHOICE

1. ANS: A                   PTS: 1                   OBJ: 2.1.1 Solve equations using the intersect method.
2. ANS: C                   PTS: 1  
OBJ: 2.2.1 Solve equations by factoring, taking the square root of both sides, completing the square, or the quadratic formula.
3. ANS: D                   PTS: 1  
OBJ: 2.2.1 Solve equations by factoring, taking the square root of both sides, completing the square, or the quadratic formula.
4. ANS: A                   PTS: 1                   OBJ: 2.2.2 Solve quadratic applications.
5. ANS: C                   PTS: 1                   OBJ: 2.4.1 Solve absolute-value equations.
6. ANS: A                   PTS: 1                   OBJ: 2.4.1 Solve absolute-value equations.
7. ANS: A                   PTS: 1                   OBJ: 2.4.2 Solve radical equations.
8. ANS: C                   PTS: 1                   OBJ: 2.4.2 Solve radical equations.
9. ANS: B                   PTS: 1                   OBJ: 2.4.3 Solve fractional equations.
10. ANS: B                   PTS: 1                   OBJ: 2.5.1 Use interval notation.
11. ANS: D                   PTS: 1  
OBJ: 2.5.2 Solve linear inequalities and extended linear inequalities.
12. ANS: A                   PTS: 1  
OBJ: 2.5.3 Find exact solutions of quadratic and factorable inequalities.
13. ANS: D                   PTS: 1                   OBJ: 3.1.1 Determine whether a relation is a function.
14. ANS: B                   PTS: 1  
OBJ: 3.2.1 Determine whether a graph represents a function.
15. ANS: B                   PTS: 1                   OBJ: 3.3.1 Define three forms for quadratic functions.
16. ANS: A                   PTS: 1  
OBJ: 3.3.3 Convert one form of a quadratic function to another.
17. ANS: C                   PTS: 1                   OBJ: 3.4.2 Transform graphs of parent functions.
18. ANS: B                   PTS: 1  
OBJ: 3.5.2 Form composite functions and find their domains.
19. ANS: D                   PTS: 1                   OBJ: 4.1.2 Divide polynomials.
20. ANS: B                   PTS: 1  
OBJ: 4.1.4 Determine the maximum number of zeros of a polynomial.
21. ANS: C                   PTS: 1                   OBJ: 4.4.1 Find the domain of a rational function.
22. ANS: B                   PTS: 1  
OBJ: 4.4.2 Find intercepts, vertical asymptotes, and horizontal asymptotes.

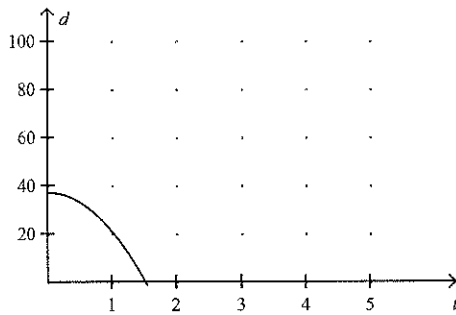
#### SHORT ANSWER

23. ANS:  
 $x = \frac{2}{3}, \frac{1}{3}, \text{ or } 2$

PTS: 1                   OBJ: 2.1.2 Solve equations using the x-intercept method.



24. ANS:



about 1.5 seconds

PTS: 1                      OBJ: 2.1.2 Solve equations using the x-intercept method.

25. ANS:

$$x = \frac{3}{5} \text{ or } -\frac{4}{5}$$

PTS: 1

OBJ: 2.2.1 Solve equations by factoring, taking the square root of both sides, completing the square, or the quadratic formula.

26. ANS:

$$\frac{5 + \sqrt{33}}{4} \text{ or } \frac{5 - \sqrt{33}}{4}$$

PTS: 1

OBJ: 2.2.2 Solve quadratic applications.

27. ANS:

1.23 years

PTS: 1

OBJ: 2.3.1 Solve application problems.

28. ANS:

15 ft

PTS: 1

OBJ: 2.3.1 Solve application problems.

29. ANS:

$$\frac{64}{25}$$

PTS: 1

OBJ: 2.4.2 Solve radical equations.

30. ANS:

$$x = -\frac{1}{4} \text{ or } -3$$

PTS: 1

OBJ: 2.4.3 Solve fractional equations.

31. ANS:

$$[-12, \infty)$$

PTS: 1

OBJ: 2.5.2 Solve linear inequalities and extended linear inequalities.

32. ANS:

$$[-6, 3) \text{ or } [5, \infty)$$

PTS: 1

OBJ: 2.5.3 Find exact solutions of quadratic and factorable inequalities.

33. ANS:

between 4 and 6 seconds

PTS: 1

OBJ: 2.5.3 Find exact solutions of quadratic and factorable inequalities.

34. ANS:

The domain is  $x \geq -4$ .

PTS: 1

OBJ: 3.1.2 Find the domain of functions.

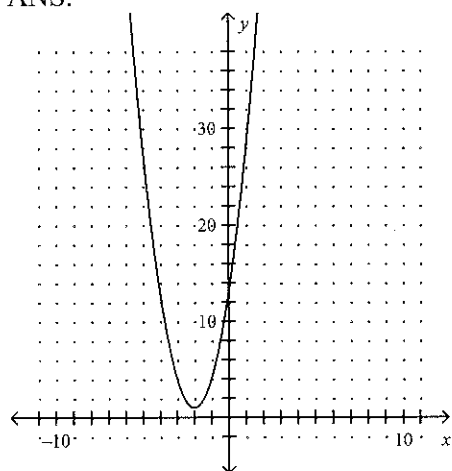
35. ANS:

a. -4.3 b. -0.1 c. 11.4

PTS: 1

OBJ: 3.1.3 Evaluate piecewise-defined and greatest integer functions.

36. ANS:

Vertex is  $(-2, 1)$ .  $y$ -intercept = 13.

PTS: 1

OBJ: 3.3.2 Find the vertex and intercepts of a quadratic function and sketch its graph.

37. ANS:

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

PTS: 1

OBJ: 3.4.1 Define parent functions

38. ANS:

$$g(x) = \pm \sqrt{\frac{x}{7}}; g(x) \text{ is not a function.}$$

PTS: 1

OBJ: 3.6.3 Determine whether an inverse relation is a function.