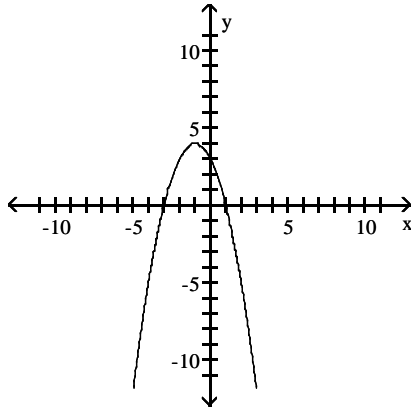


Name \_\_\_\_\_

Determine the quadratic function whose graph is given by first writing in standard form.  
Express your answer in both standard form and the form  $ax^2 + bx + c$ .

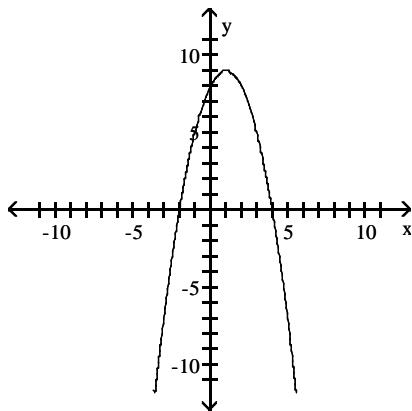
1)



Vertex:  $(-1, 4)$   
y-intercept:  $(0, 3)$

1) \_\_\_\_\_

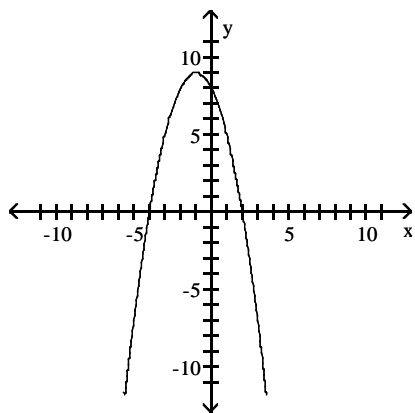
2)



Vertex:  $(1, 9)$   
y-intercept:  $(0, 8)$

2) \_\_\_\_\_

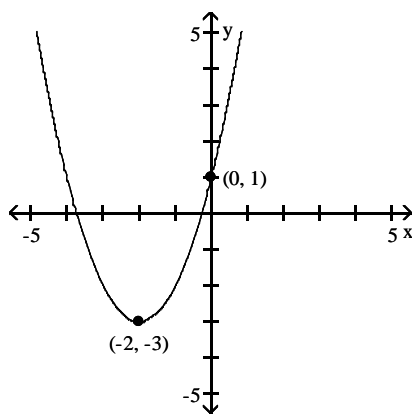
3)



Vertex:  $(-1, 9)$   
y-intercept:  $(0, 8)$

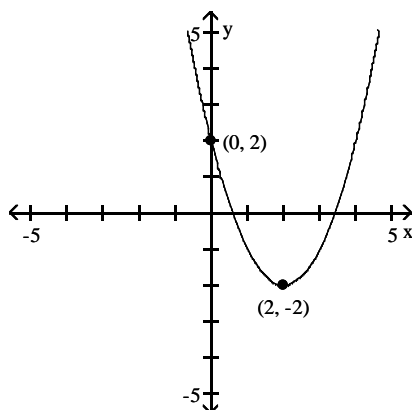
3) \_\_\_\_\_

4)



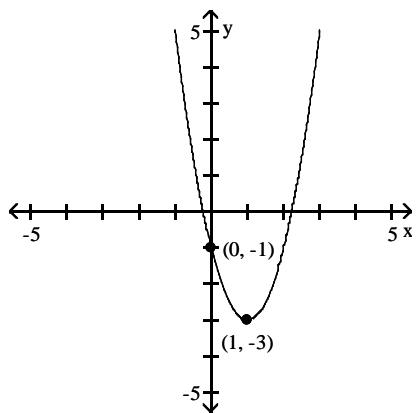
4) \_\_\_\_\_

5)



5) \_\_\_\_\_

6)

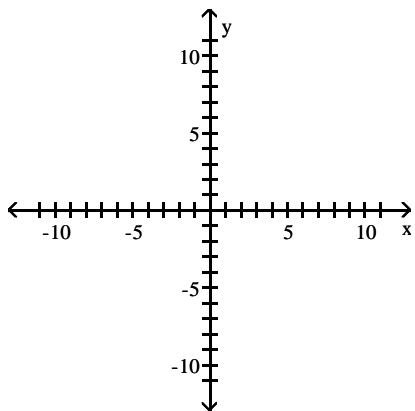


6) \_\_\_\_\_

Graph the function  $f$  by starting with the graph of  $y = x^2$ , writing  $f$  in standard form, and using transformations (shifting, compressing, stretching, and/or reflection).

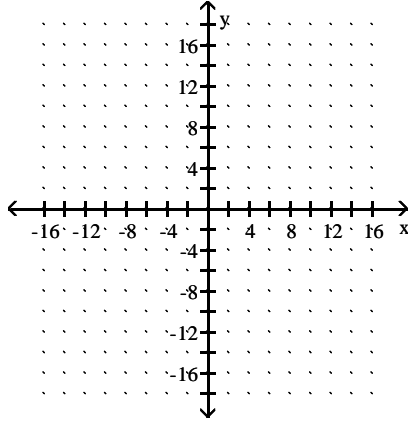
7)  $f(x) = x^2 + 6x + 5$

7) \_\_\_\_\_



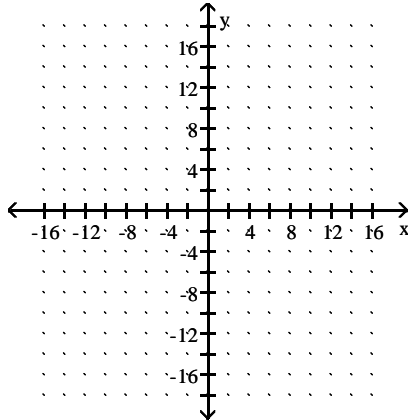
Sketch the graph of the function and find the domain and range.

8)  $f(x) = x^2 - 9$



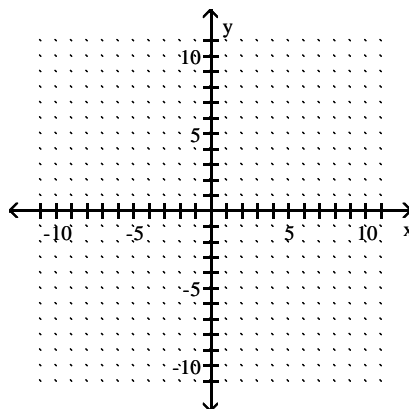
8) \_\_\_\_\_

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



9) \_\_\_\_\_

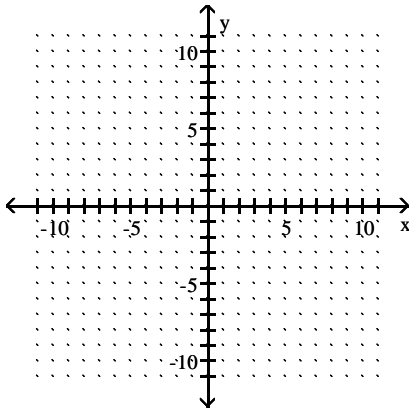
10)  $f(x) = (x - 1)^2 + 5$



10) \_\_\_\_\_

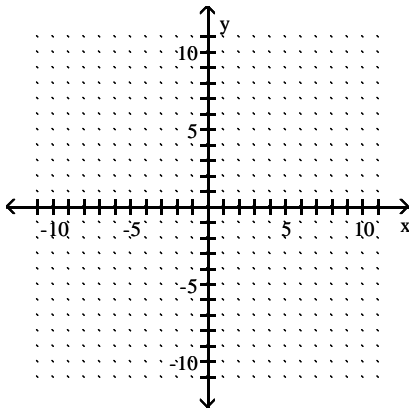
11)  $f(x) = (x + 1)^2 - 4$

11) \_\_\_\_\_



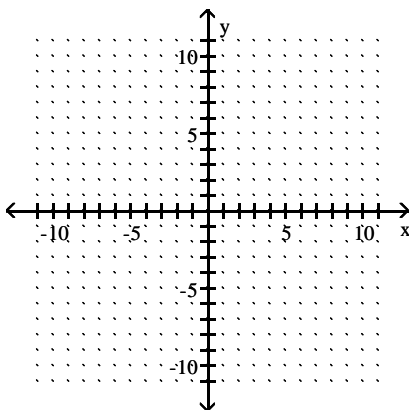
12)  $f(x) = (x - 4)^2$

12) \_\_\_\_\_



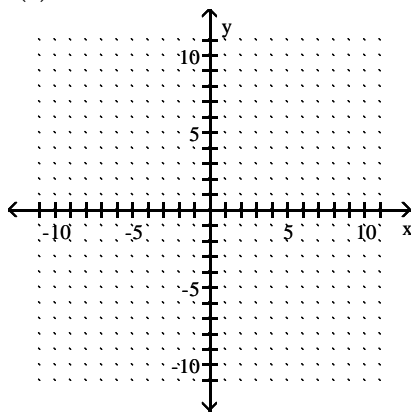
13)  $f(x) = -x^2 - 4$

13) \_\_\_\_\_



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

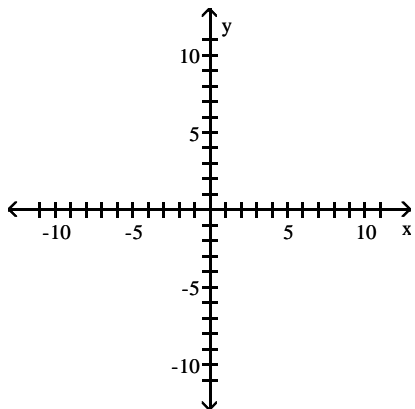
14) \_\_\_\_\_



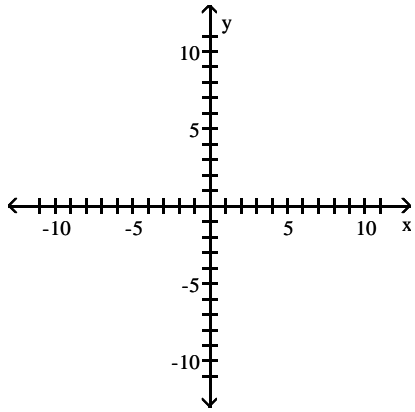
Graph the function  $f$  by starting with the graph of  $y = x^2$ , writing  $f$  in standard form, and using transformations (shifting, compressing, stretching, and/or reflection).

15)  $f(x) = x^2 + 2x - 8$

15) \_\_\_\_\_

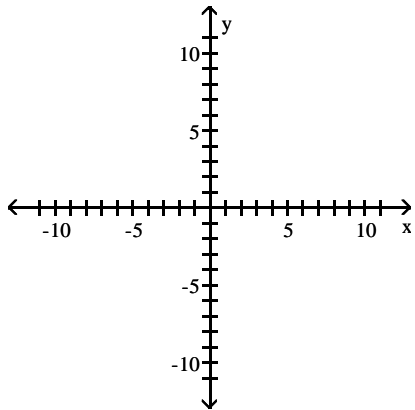


16)  $f(x) = x^2 + 8x + 7$



16) \_\_\_\_\_

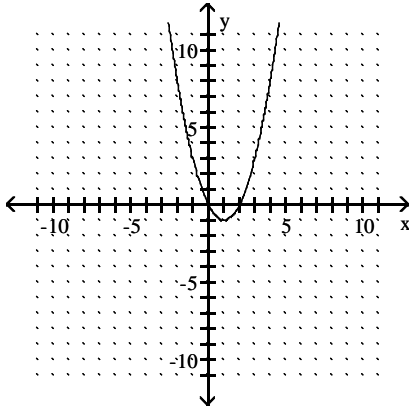
17)  $f(x) = x^2 + 4x - 5$



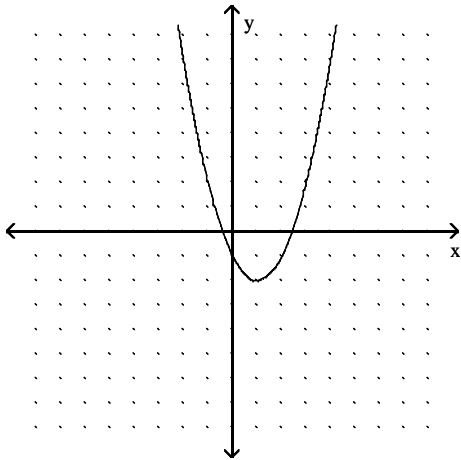
17) \_\_\_\_\_

**Solve the problem.**

- 18) Find an equation of the function  $f$  sketched below in the form  $f(x) = a(x - h)^2 + k$ . Use the vertex to find the values of  $h$  and  $k$  and use a second point on the graph to find the value of  $a$ . 18) \_\_\_\_\_



- 19) A function of the form  $y = a(x - h)^2 + k$  is graphed below. Determine whether the constants  $a$ ,  $h$ , and  $k$  are positive, negative, or zero. 19) \_\_\_\_\_



- 20) An object is propelled vertically upward from the top of a 240-foot building. The quadratic function  $s(t) = -16t^2 + 96t + 240$  models the ball's height above the ground,  $s(t)$ , in feet,  $t$  seconds after it was thrown. After how many seconds does the object reach its maximum height? Round to the nearest tenth of a second if necessary. 20) \_\_\_\_\_



- 21) You have 292 feet of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area. 21) \_\_\_\_\_
- 22) You have 332 feet of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area. 22) \_\_\_\_\_
- 23) A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 236 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed? 23) \_\_\_\_\_
- 24) A developer wants to enclose a rectangular grassy lot that borders a city street for parking. If the developer has 272 feet of fencing and does not fence the side along the street, what is the largest area that can be enclosed? 24) \_\_\_\_\_
- 25) You have 68 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. 25) \_\_\_\_\_
- 26) You have 76 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. 26) \_\_\_\_\_
- 27) The cost in millions of dollars for a company to manufacture  $x$  thousand automobiles is given by the function  $C(x) = 3x^2 - 18x + 72$ . Find the number of automobiles that must be produced to minimize the cost. 27) \_\_\_\_\_

Find the  $x$ -intercepts of the polynomial function. State whether the graph crosses the  $x$ -axis, or touches the  $x$ -axis and turns around, at each intercept.

28)  $f(x) = 9x^2 - x^3$

28) \_\_\_\_\_

29)  $f(x) = x^4 - 49x^2$

29) \_\_\_\_\_

30)  $x^5 - 3x^3 + 2x = 0$

30) \_\_\_\_\_

31)  $x^4 + 3x^3 - 70x^2 = 0$

31) \_\_\_\_\_

32)  $f(x) = x^3 + 11x^2 + 40x + 48$

32) \_\_\_\_\_

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

33) \_\_\_\_\_

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

34) \_\_\_\_\_

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

35) \_\_\_\_\_

36)  $f(x) = x^2(x - 4)(x - 2)$

36) \_\_\_\_\_

$$37) f(x) = -x^3(x + 3)^2(x - 9)$$

37) \_\_\_\_\_

$$38) f(x) = (x - 2)^2(x^2 - 9)$$

38) \_\_\_\_\_

**Determine whether the graph of the polynomial has y-axis symmetry, origin symmetry, or neither.**

$$39) f(x) = 9x^2 - x^3$$

39) \_\_\_\_\_

$$40) f(x) = 6 - x^4$$

40) \_\_\_\_\_

$$41) f(x) = x^4 - 81x^2$$

41) \_\_\_\_\_

$$42) f(x) = x^3 - 2x$$

42) \_\_\_\_\_

$$43) f(x) = x^3 + x^2 + 1$$

43) \_\_\_\_\_

$$44) f(x) = x(4 - x^2)$$

44) \_\_\_\_\_

$$45) x^5 - 3x^3 + 2x = 0$$

45) \_\_\_\_\_

46)  $f(x) = x^3 + 9x^2 + 24x + 20$

46) \_\_\_\_\_

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

47) \_\_\_\_\_

48)  $f(x) = -x^2(x + 8)(x^2 - 1)$

48) \_\_\_\_\_

49)  $f(x) = -x^3(x + 1)^2(x - 8)$

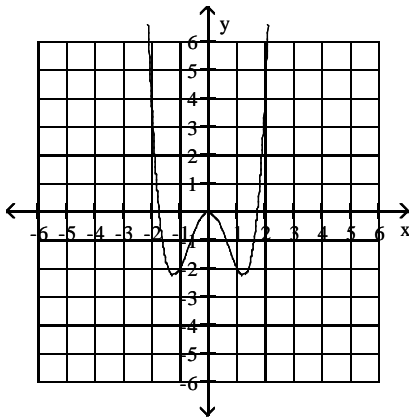
49) \_\_\_\_\_

50)  $f(x) = (x - 3)^2(x^2 - 25)$

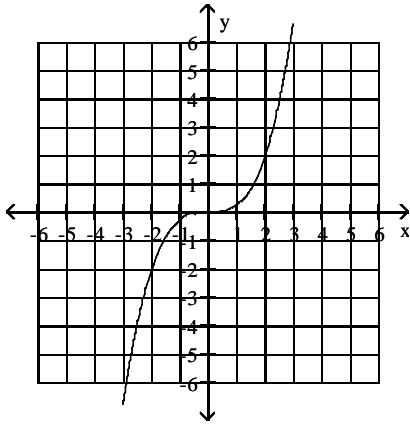
50) \_\_\_\_\_

51)

51) \_\_\_\_\_

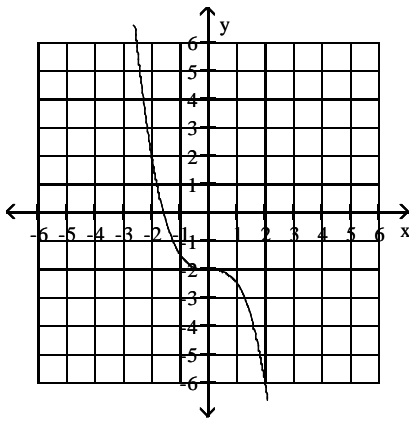


52)



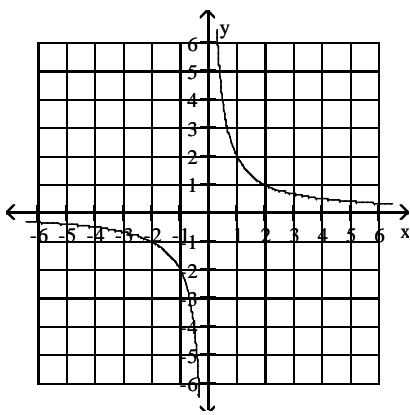
52) \_\_\_\_\_

53)



53) \_\_\_\_\_

54)



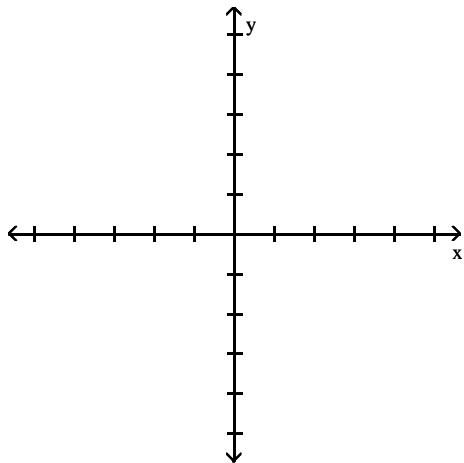
54) \_\_\_\_\_

Complete the following:

- (a) Use the Leading Coefficient Test to determine the graph's end behavior.
- (b) Find the x-intercepts. State whether the graph crosses the x-axis or touches the x-axis and turns around at each intercept.
- (c) Find the y-intercept.
- (d) Graph the function.

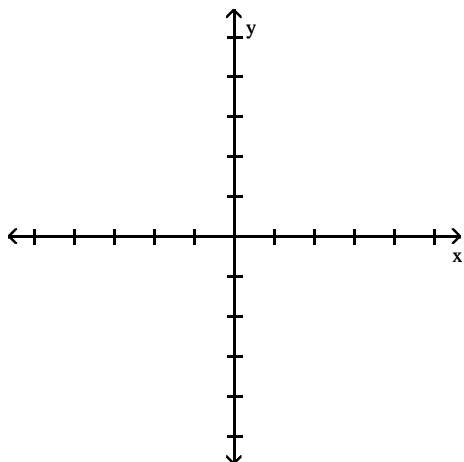
55)  $f(x) = x^2(x + 2)$

55) \_\_\_\_\_

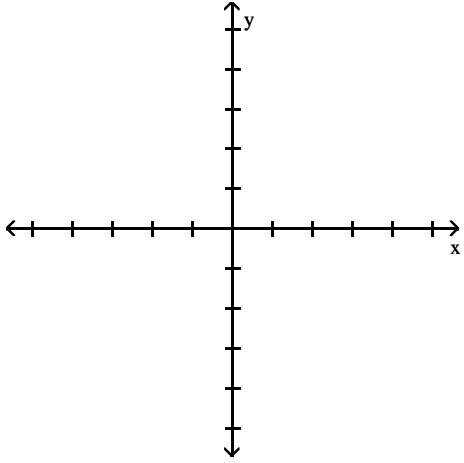


56)  $f(x) = (x + 3)(x - 1)^2$

56) \_\_\_\_\_

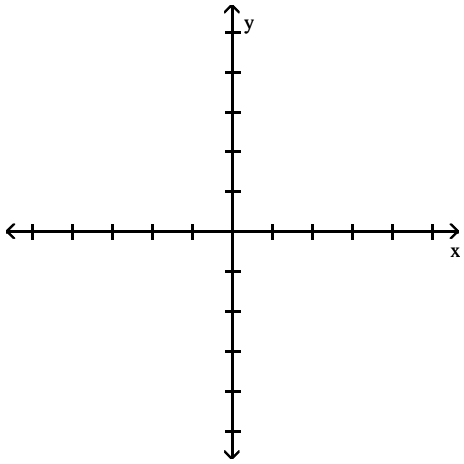


57)  $f(x) = -2(x - 2)(x + 3)^3$



57) \_\_\_\_\_

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

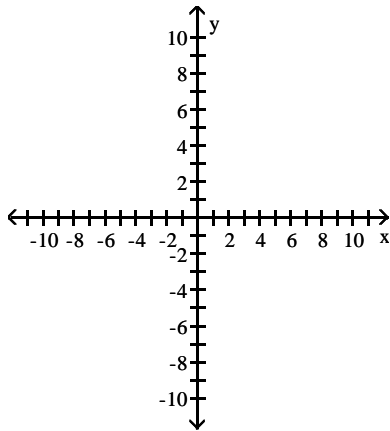


58) \_\_\_\_\_

Graph the polynomial function.

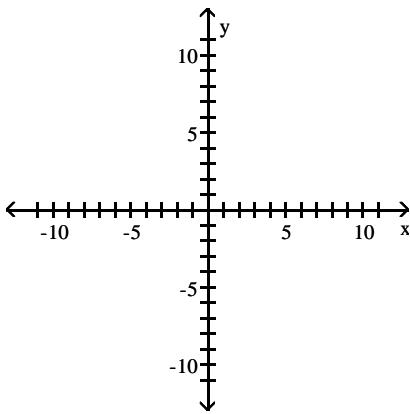
59)  $f(x) = x^4 - 4x^2$

59) \_\_\_\_\_



60)  $f(x) = 2x^2 - x^3$

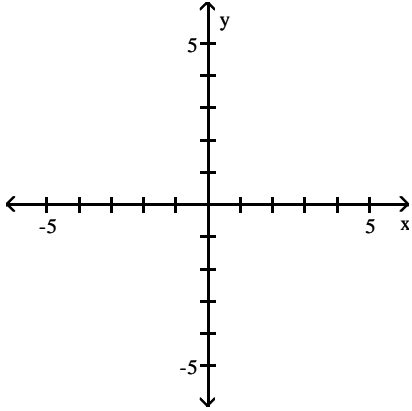
60) \_\_\_\_\_





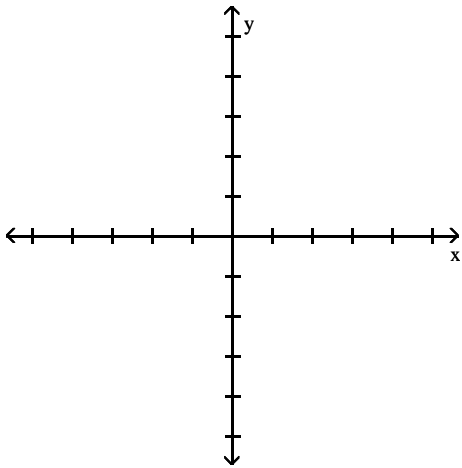
61)  $f(x) = \frac{1}{3} - \frac{1}{3}x^4$

61) \_\_\_\_\_

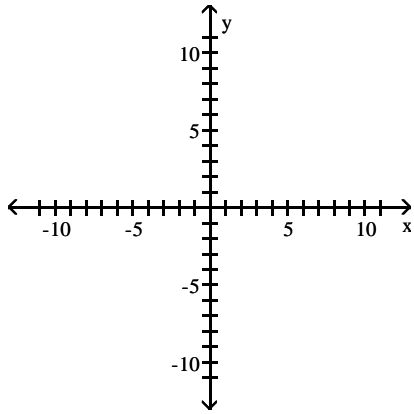


62)  $f(x) = x^3 + 2x^2 - x - 2$

62) \_\_\_\_\_

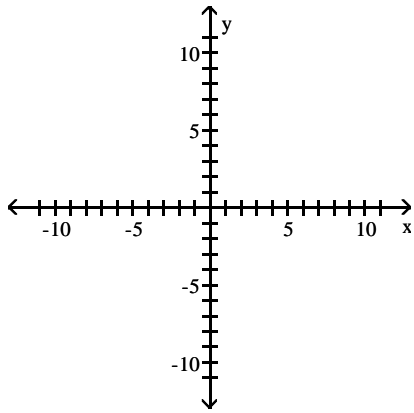


63)  $f(x) = x^3 + 2x^2 - 5x - 6$



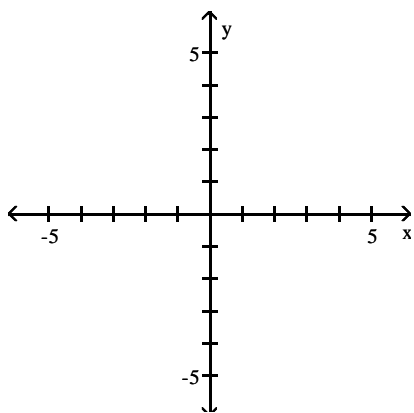
63) \_\_\_\_\_

64)  $f(x) = 7x - x^3 - x^5$



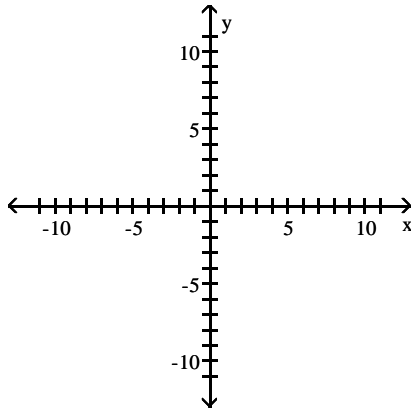
64) \_\_\_\_\_

65)  $f(x) = 6x^4 + 9x^3$



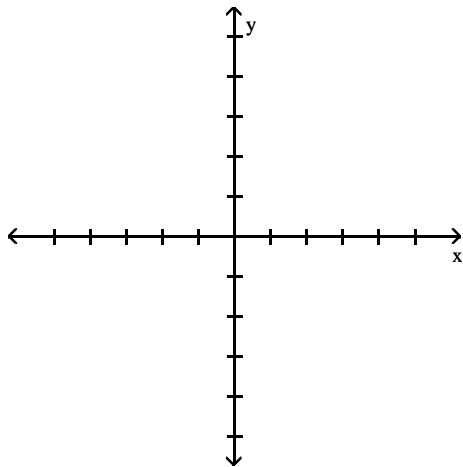
65) \_\_\_\_\_

66)  $f(x) = 6x^3 - 7x - x^5$



66) \_\_\_\_\_

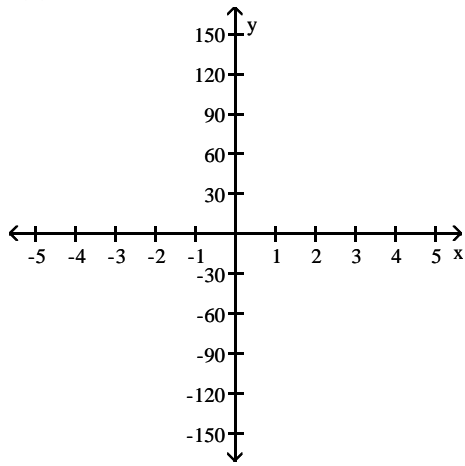
67)  $f(x) = x^4 - 14x^3 + 49x^2$



67) \_\_\_\_\_

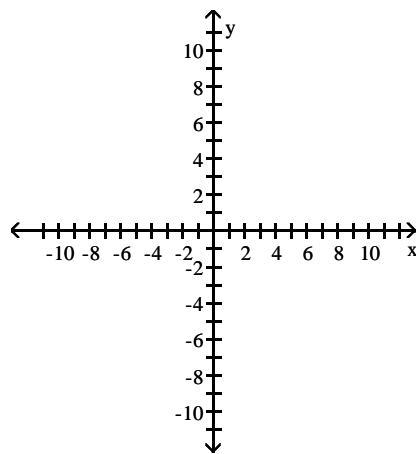
68)  $f(x) = x^5 - 2x^3 - 48x$

68) \_\_\_\_\_



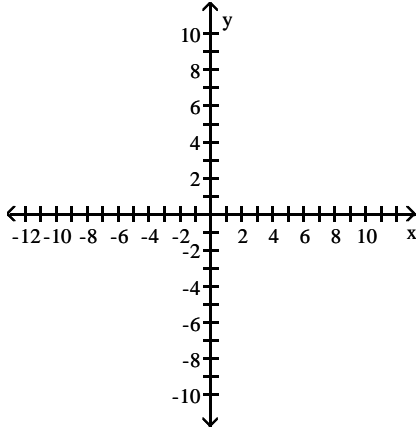
69)  $f(x) = x^4 + 2x^3 - x^2 - 2$

69) \_\_\_\_\_



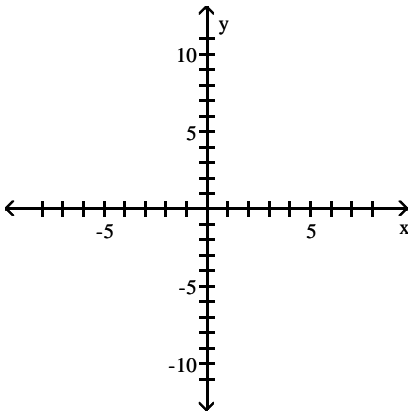
70)  $f(x) = x^4 + 4x^3 + 4x^2$

70) \_\_\_\_\_



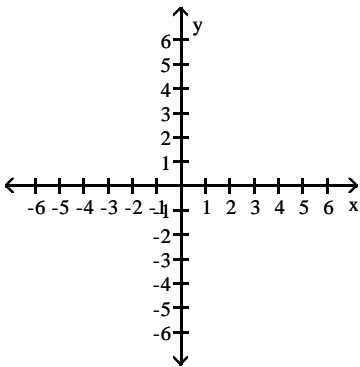
71)  $f(x) = 3x(x + 2)^3$

71) \_\_\_\_\_



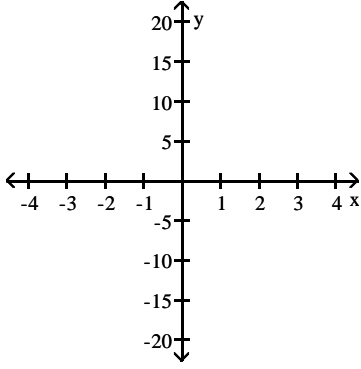
72)  $f(x) = x(x + 1)(x + 4)$

72) \_\_\_\_\_



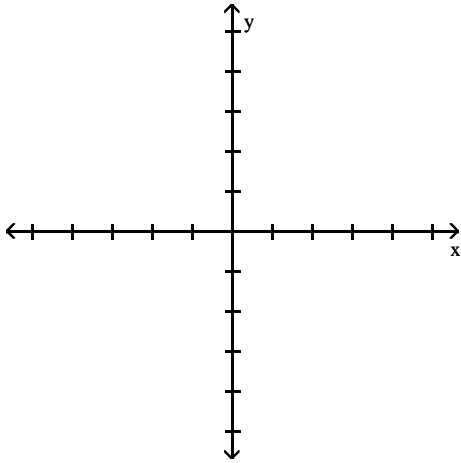
73)  $f(x) = -x^2(x - 4)(x - 1)$

73) \_\_\_\_\_



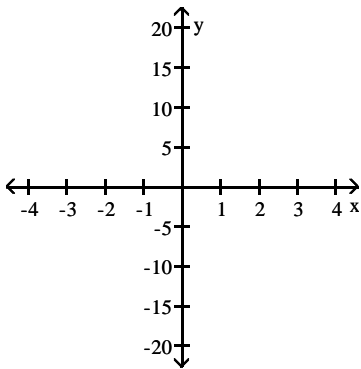
74)  $f(x) = (x + 1)^2(x^2 - 25)$

74) \_\_\_\_\_



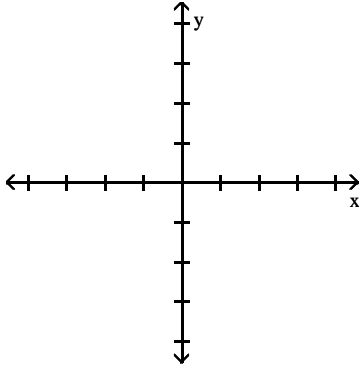
75)  $f(x) = -x^2(x - 1)(x + 1)$

75) \_\_\_\_\_



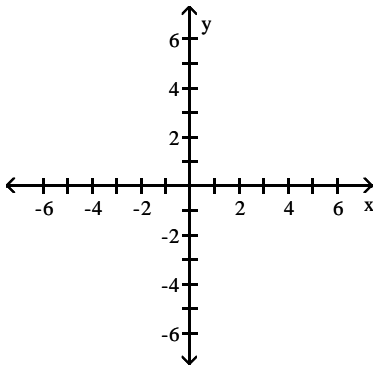
76)  $f(x) = -2x^3(x + 1)^2(x + 2)$

76) \_\_\_\_\_



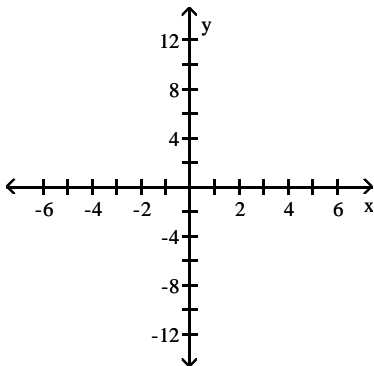
77)  $f(x) = (x - 1)(x + 2)(x + 3)$

77) \_\_\_\_\_



78)  $f(x) = (x - 5)(x - 4)(x - 2)^2$

78) \_\_\_\_\_



# Answer Key

Testname: Q4PREP3.1TO3.2V02

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

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

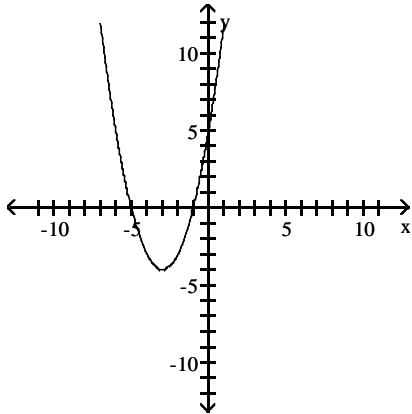
3)  $f(x) = -x^2 - 2x + 8$

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

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

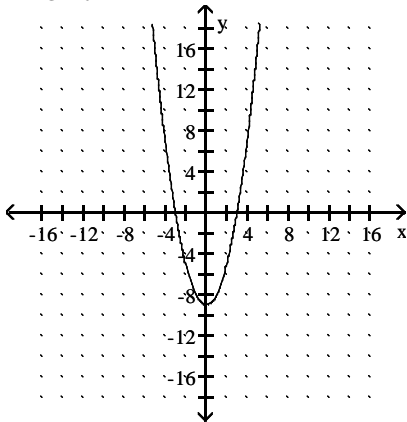
6)  $f(x) = 2x^2 - 4x - 1$

7)



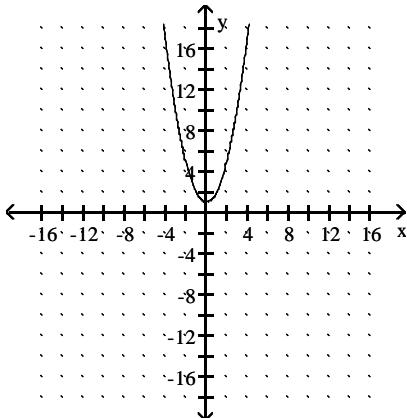
8) domain: all real numbers

range:  $y \geq -9$



9) domain: all real numbers

range:  $y \geq 1$



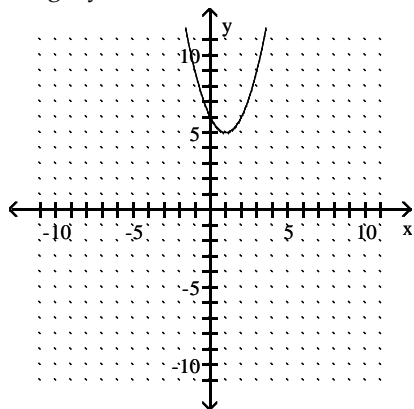


# Answer Key

Testname: Q4PREP3.1TO3.2V02

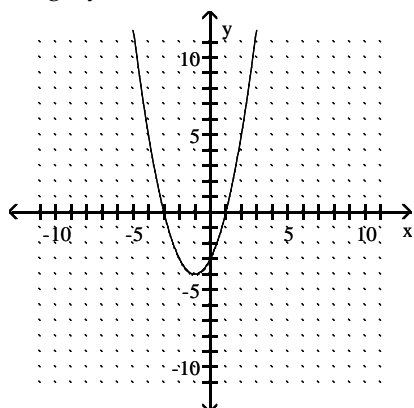
10) domain: all real numbers

range:  $y \geq 5$



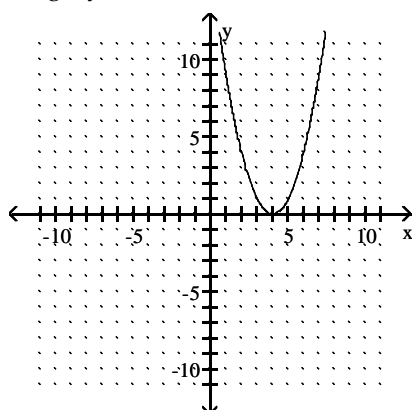
11) domain: all real numbers

range:  $y \geq -4$



12) domain: all real numbers

range:  $y \geq 0$

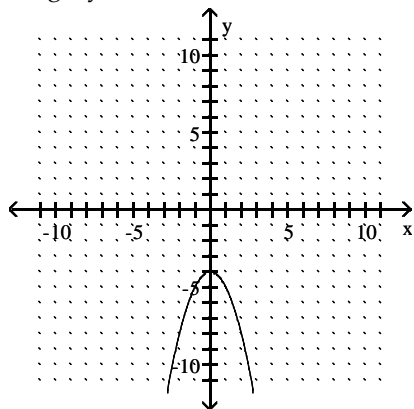


Answer Key

Testname: Q4PREP3.1TO3.2V02

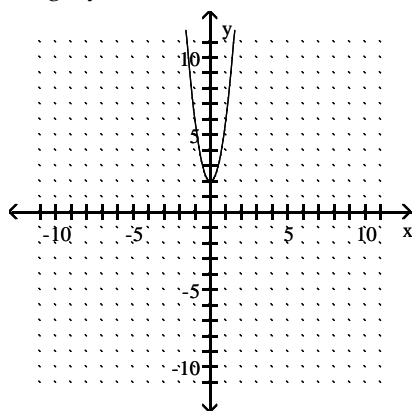
13) domain: all real numbers

range:  $y \leq -4$

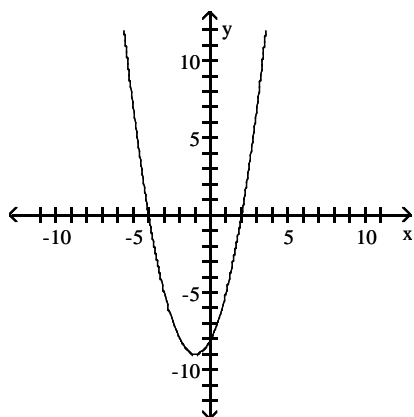


14) domain: all real numbers

range:  $y \geq 2$



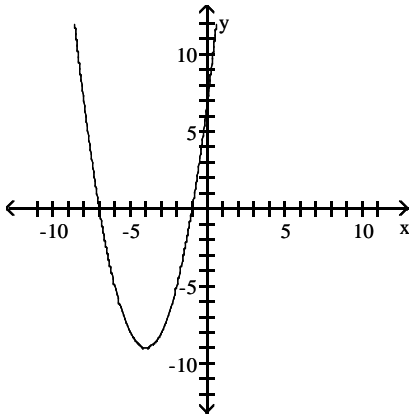
15)



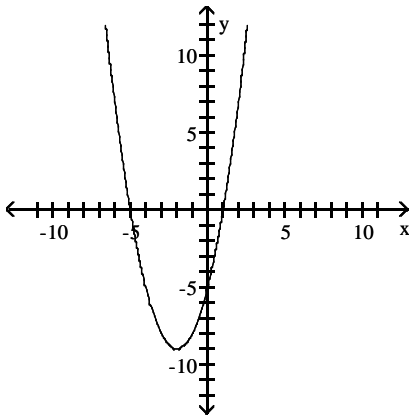
Answer Key

Testname: Q4PREP3.1TO3.2V02

16)



17)



18)  $f(x) = (x - 1)^2 - 1$

19) a is positive, h is positive, k is negative

20) 3 sec

21) 73 ft by 73 ft

22) 83 ft by 83 ft

23)  $6962 \text{ ft}^2$

24)  $9248 \text{ ft}^2$

25) length: 34 ft, width: 17 ft

26) length: 38 ft, width: 19 ft

27) 3 thousand automobiles

28) 0, touches the x-axis and turns around;

9, crosses the x-axis

29) 0, touches the x-axis and turns around;

7, crosses the x-axis;

-7, crosses the x-axis

30) 0, crosses the x-axis;

1, crosses the x-axis;

-1, crosses the x-axis;

$\sqrt{2}$ , crosses the x-axis;

$-\sqrt{2}$ , crosses the x-axis

31) 0, touches the x-axis and turns around;

-10, crosses the x-axis;

7, crosses the x-axis

## Answer Key

Testname: Q4PREP3.1TO3.2V02

- 32) -4, touches the x-axis and turns around;  
-3, crosses the x-axis.
- 33) -1, crosses the x-axis;  
4, crosses the x-axis;  
1, touches the x-axis and turns around
- 34) 0, touches the x-axis and turns around;  
-4, crosses the x-axis;  
-1, crosses the x-axis;  
1, crosses the x-axis
- 35) 0, touches the x-axis and turns around;  
-4, crosses the x-axis
- 36) 0, touches the x-axis and turns around;  
4, crosses the x-axis;  
2, crosses the x-axis
- 37) 0, crosses the x-axis;  
-3, touches the x-axis and turns around;  
9, crosses the x-axis
- 38) 2, touches the x-axis and turns around;  
-3, crosses the x-axis;  
3, crosses the x-axis
- 39) neither
- 40) y-axis symmetry
- 41) y-axis symmetry
- 42) origin symmetry
- 43) neither
- 44) origin symmetry
- 45) origin symmetry
- 46) neither
- 47) neither
- 48) neither
- 49) neither
- 50) neither
- 51) y-axis symmetry
- 52) origin symmetry
- 53) neither
- 54) origin symmetry

# Answer Key

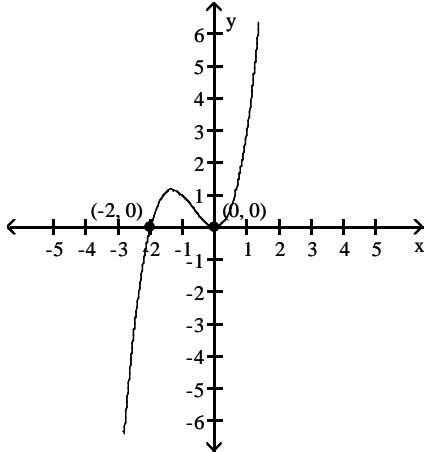
Testname: Q4PREP3.1TO3.2V02

55) (a) falls to the left and rises to the right

(b) x-intercepts:  $(0, 0)$ , touches x-axis and turns;  $(-2, 0)$ , crosses x-axis

(c) y-intercept:  $(0, 0)$

(d)

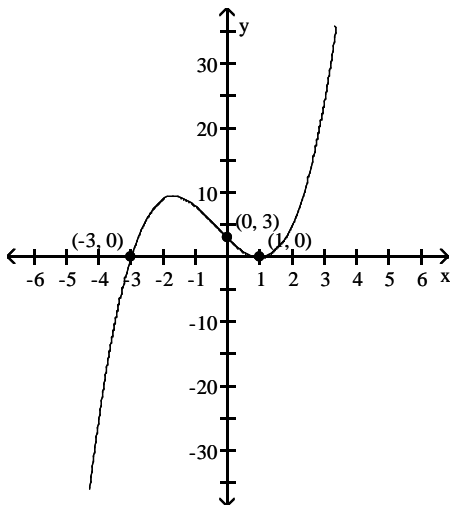


56) (a) falls to the left and rises to the right

(b) x-intercepts:  $(1, 0)$ , touches x-axis and turns;  $(-3, 0)$ , crosses x-axis

(c) y-intercept:  $(0, 3)$

(d)



# Answer Key

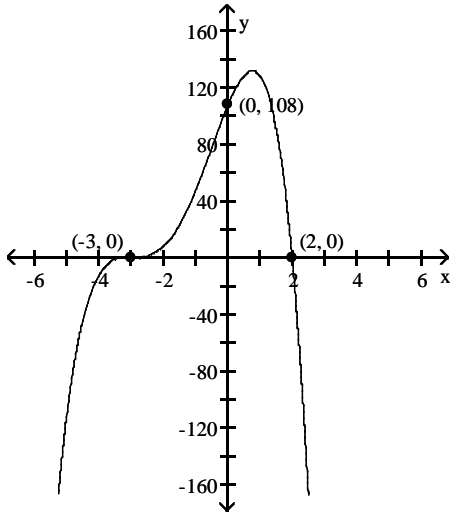
Testname: Q4PREP3.1TO3.2V02

57) (a) falls to the left and to the right

(b) x-intercepts:  $(-3, 0)$ , crosses x-axis;  $(2, 0)$ , crosses x-axis

(c) y-intercept:  $(0, 108)$

(d)

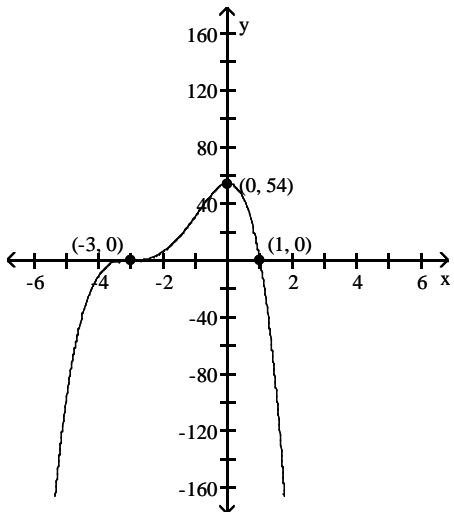


58) (a) falls to the left and to the right

(b) x-intercepts:  $(-3, 0)$ , crosses x-axis;  $(1, 0)$ , crosses x-axis

(c) y-intercept:  $(0, 54)$

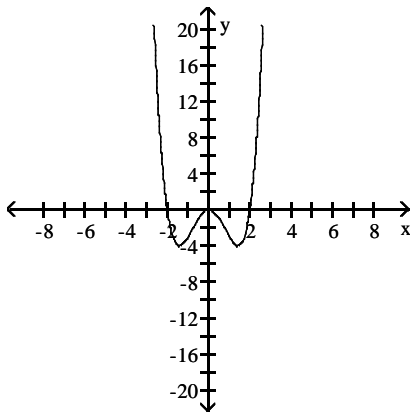
(d)



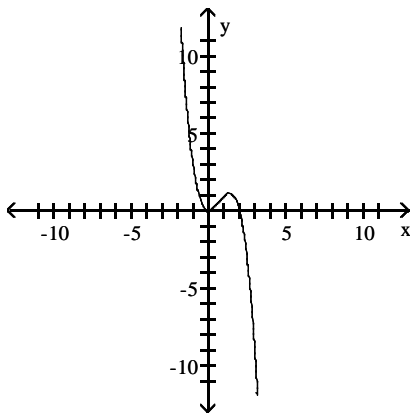
Answer Key

Testname: Q4PREP3.1TO3.2V02

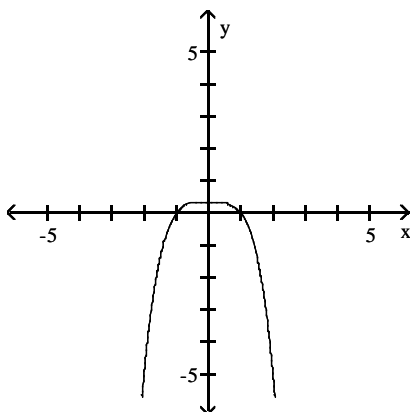
59)



60)

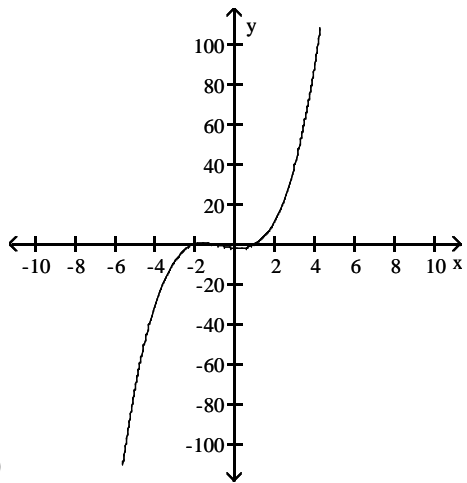


61)



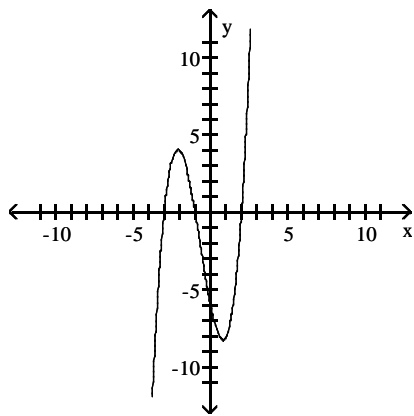
Answer Key

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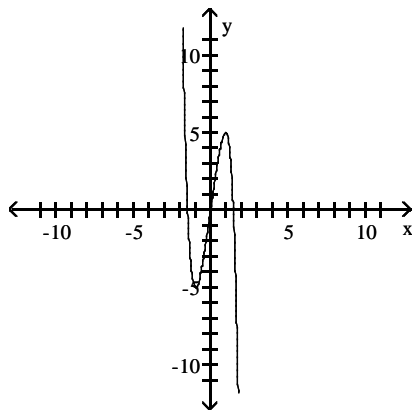


62)

63)



64)

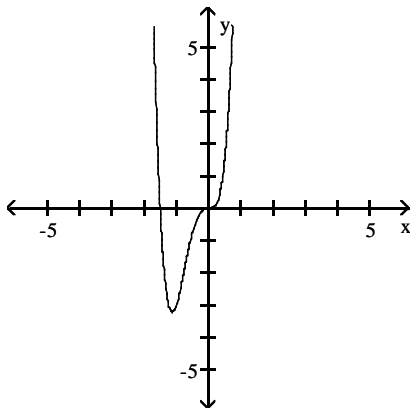




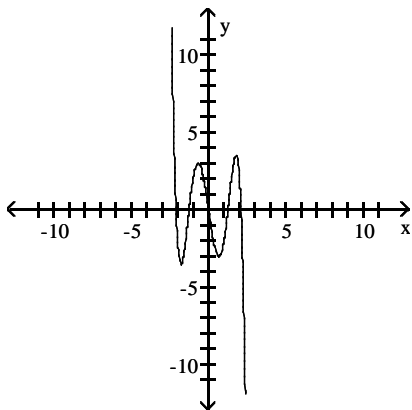
Answer Key

Testname: Q4PREP3.1TO3.2V02

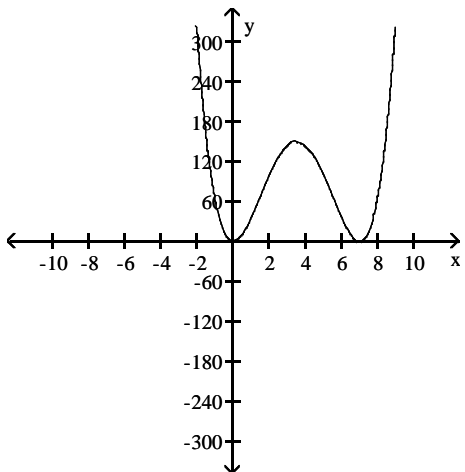
65)



66)



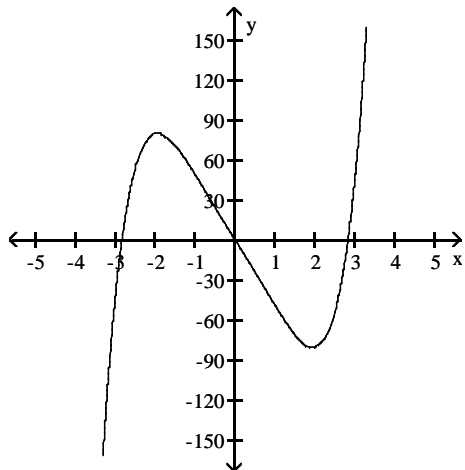
67)



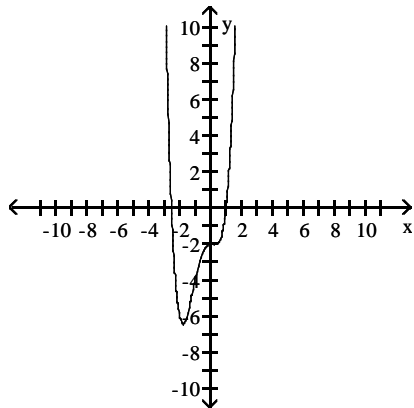
Answer Key

Testname: Q4PREP3.1TO3.2V02

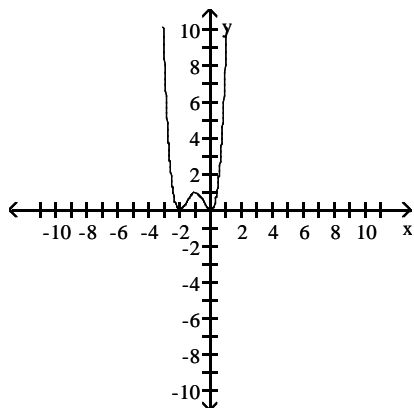
68)



69)



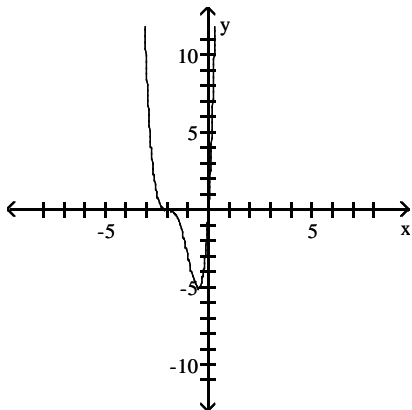
70)



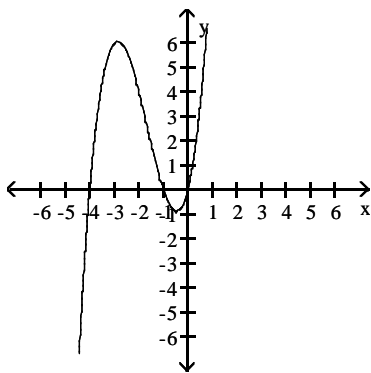
Answer Key

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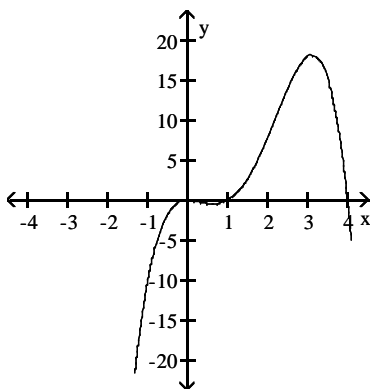
71)



72)

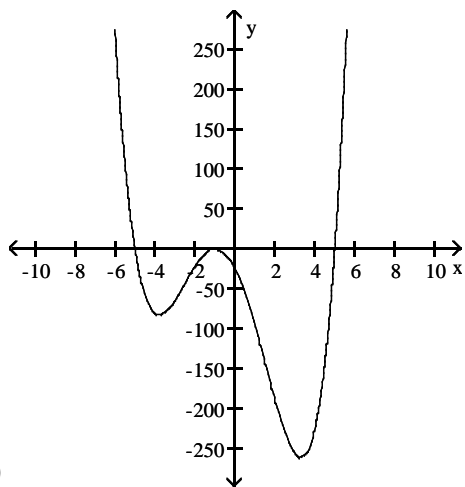


73)

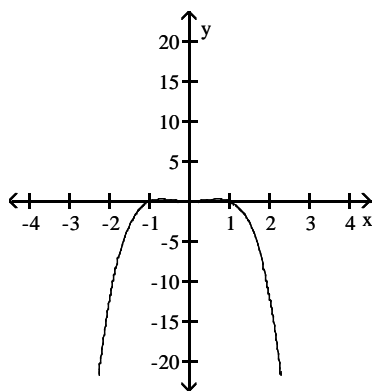


Answer Key

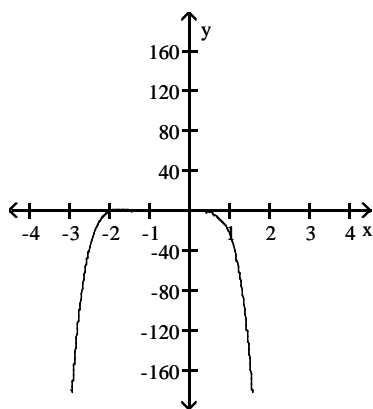
Testname: Q4PREP3.1TO3.2V02



74)  
75)



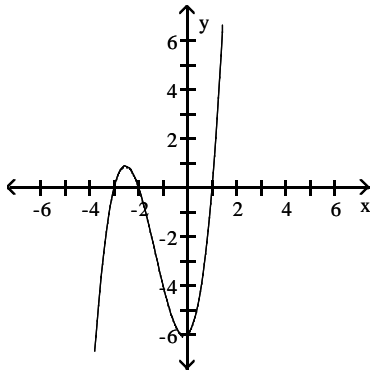
76)



Answer Key

Testname: Q4PREP3.1TO3.2V02

77)



78)

