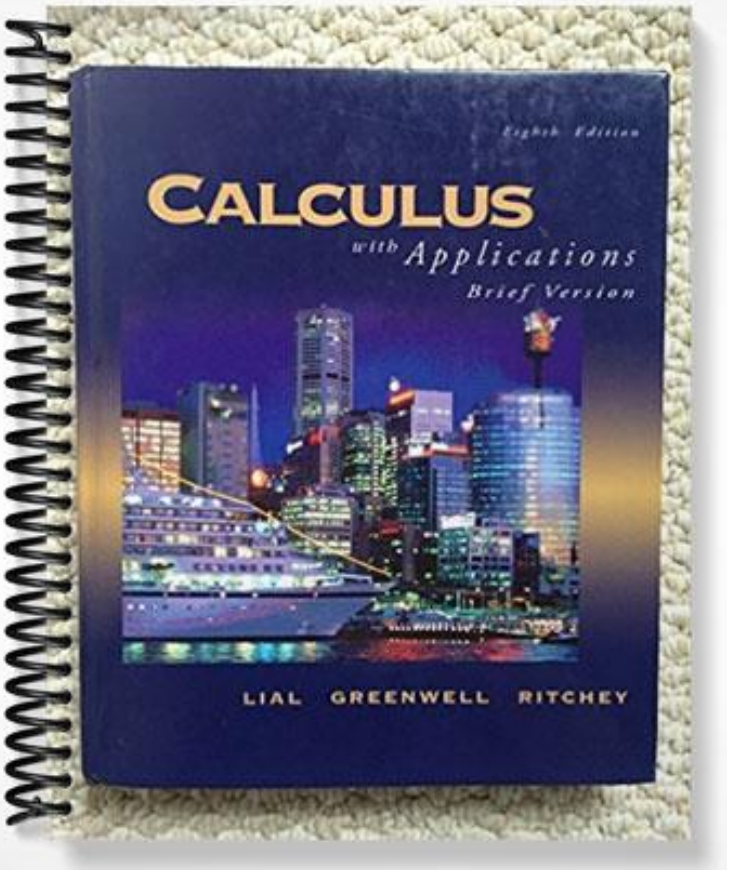
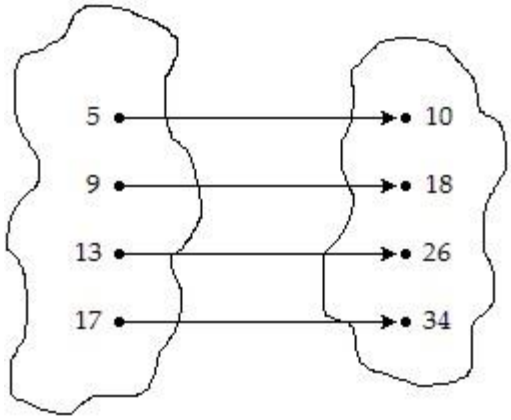
TEST BANK


Eighth Edition
CALCULUS
with Applications
Brief Version
LIAL GREENWELL RITCHEY

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
Determine whether the rule defines y as a function of x.

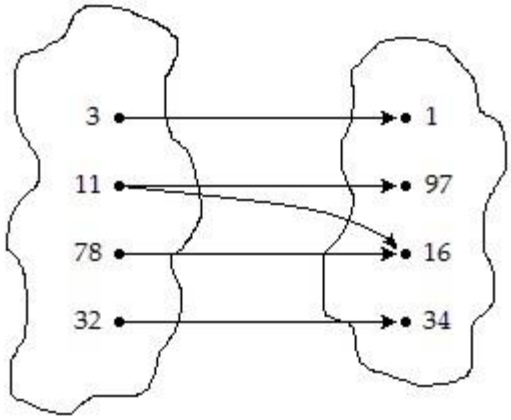
1) X Y 1) _____



A) Function B) Not a function

2) 2) _____

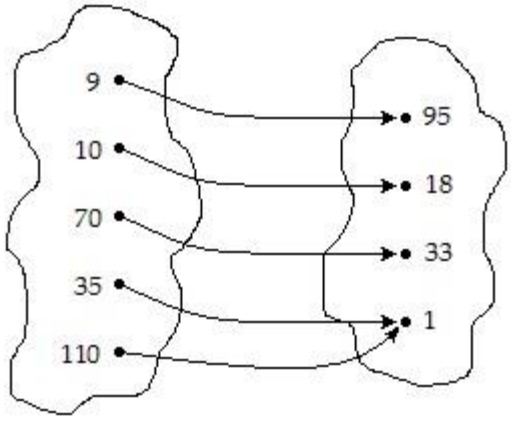
X Y



A) Function B) Not a function

3) 3) _____

X Y



A) Function B) Not a function

4)

4)

x	y
–7	–5
–7	8
2	6
6	–5
7	8

__
__
__
_

A) Function B) Not a function

5) 5) _____

x	y
–2	9
1	–5
4	–6
8	8
11	8

A) Function B) Not a function

6) $y = x^5 + 2$ 6) _____

A) Function B) Not a function

7) $x = y^2 + 5$ 7) _____

A) Function B) Not a function

Give the range for the function if the domain is {-2, -1, 0, 1, 2}.

8) $y = x + 7$ 8) _____

A) {5, 6, 7, 8, 9} B) {-2, -1, 0, 1, 2} C) {-5, -3, -1, 1, 3} D) {5, 7, 9, 11, 13}

9) $y = 2x - 1$ 9) _____

A) {-4, -3, -2, -1, 0} B) {-3, -1, 1, 3, 5}
C) {-5, -3, -1, 1, 3} D) {-2, -1, 0, 1, 2}

10) $3x + y = 11$ 10) _____

A) {17, 14, 11, 8, 5} B) {13, 11, 9, 7, 5}
C) {-5, -8, -11, -14, -17} D) {-5, -7, -9, -11, -13}

11) $5x - y = 2$ 11) _____

A) {-10, 0, 10} B) {-12, -7, -2, 3, 8}
C) {-12, 0, 12} D) {-10, -5, 0, 5, 10}

12) $y = x(x - 1)$ 12) _____

A) {0, 4, 8} B) {0, 2, 6} C) {-8, -4, 0, 4, 8} D) {-6, -2, 0, 2, 6}

13) $y = x^2$ 13) _____

A) {0, 1, 2} B) {-2, -1, 0, 1, 2} C) {-4, -1, 0, 1, 4} D) {0, 1, 4}

14) $y = -4x^2$ 14) _____

A) {-16, -4, 0} B) {0, 4, 16} C) {-4, 0, 4} D) {-16, 0, 16}

15) $y = \frac{x}{x+3}$ 15) _____

A) $\left\{-1, -\frac{1}{2}, 0, \frac{3}{4}, \frac{7}{5}\right\}$ B) $\left\{-1, \frac{1}{2}, 0, \frac{3}{4}, \frac{7}{5}\right\}$

C) $\left\{-2, -\frac{1}{2}, 0, \frac{1}{4}, \frac{2}{5}\right\}$ D) $\left\{-2, \frac{1}{2}, 0, \frac{1}{4}, \frac{2}{5}\right\}$

16) $y = \frac{-3}{x+7}$ 16) _____

A) $\left\{-\frac{3}{5}, -\frac{1}{2}, -\frac{3}{7}, -\frac{3}{8}, -\frac{1}{3}\right\}$ B) $\left\{-\frac{3}{11}, -\frac{1}{2}, -\frac{3}{7}, -\frac{3}{8}, -\frac{1}{3}\right\}$

C) $\left\{-\frac{3}{7}, -\frac{1}{2}, -\frac{3}{8}, -\frac{1}{3}, -1\right\}$ D) $\left\{-\frac{3}{8}, -\frac{1}{4}, -\frac{3}{5}, -\frac{3}{5}, -1\right\}$

17) $y = \frac{x-5}{x+5}$ 17) _____

A) $\left\{-\frac{7}{3}, -\frac{3}{2}, -1, -\frac{2}{3}, -\frac{3}{7}\right\}$ B) $\left\{-\frac{7}{6}, -\frac{3}{4}, 1, -\frac{2}{5}, -\frac{3}{8}\right\}$

C) $\left\{-\frac{7}{5}, -\frac{3}{4}, -1, -\frac{2}{3}, -\frac{3}{7}\right\}$ D) $\left\{-\frac{7}{4}, -\frac{3}{2}, 1, -\frac{2}{5}, -\frac{3}{8}\right\}$

Give the domain of the function.

18) $f(x) = 3x + 5$ 18) _____

A) $(-\infty, 0) \cup (0, \infty)$ B) $(-\infty, \infty)$ C) $[-5, \infty)$ D) $(0, \infty)$

19) $f(x) = |7x + 6|$ 19) _____

A) $\left(-\infty, -\frac{6}{7}\right] \cup \left[-\frac{6}{7}, \infty\right)$ B) $(-\infty, \infty)$

C) $[0, \infty)$ D) $\left[-\frac{6}{7}, \infty\right)$

20) $f(x) = 5x^2 + 2x + 1$ 20) _____

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

21) $f(x) = \frac{x^4 + 4}{x^2 + 6x - 16}$ 21) _____

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

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

22) $f(x) = (-x - 4)^{1/2}$ 22) _____

A) $[4, \infty)$ B) $[-4, \infty)$ C) $(-\infty, 4]$ D) $(-\infty, -4]$

23) $f(x) = \sqrt{10 - x}$ 23) _____

A) $[0, 10]$ B) $(-\infty, 10]$

C) $(-\infty, 10) \cup (10, \infty)$ D) $(-\infty, \infty)$

24) $f(x) = \sqrt{\frac{x+1}{x-6}}$ 24) _____

A) $(-1, 6)$ B) $(-\infty, -1] \cup [6, \infty)$ C) $(-\infty, -1) \cup (6, \infty)$ D) $(-\infty, -1] \cup (6, \infty)$

25) $g(z) = \sqrt{16 - z^2}$ 25) _____

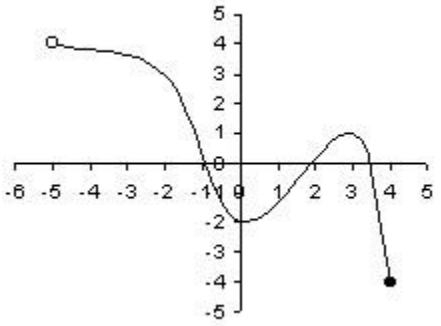
A) [-4, 4] B) [0, ∞) C) (-∞, ∞) D) (-4, 4)

26) $f(x) = \dfrac{1}{\sqrt{x^2 + 4x - 32}}$ 26) _____

A) (-∞, 4) ∪ (8, ∞) B) (8, 4) C) (-∞, ∞) D) (-∞, -8) ∪ (4, ∞)

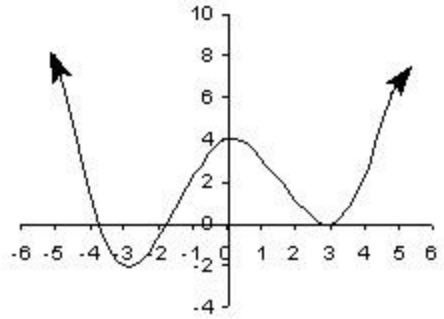
Give the domain and range of the function.

27) 27) _____



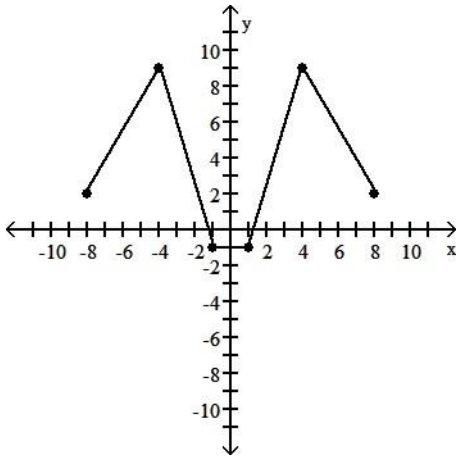
A) Domain (-5, 4) ; Range [-2, 4) B) Domain (-5, 4] ; Range [-4, 4)
C) Domain [-4, 4) ; Range (-5, 4] D) Domain [-5, 4] ; Range [-4, 4]

28) 28) _____



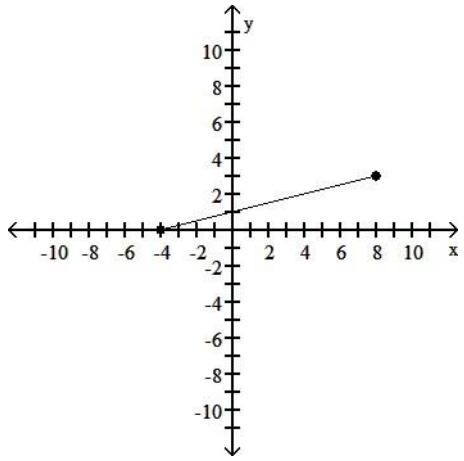
A) Domain (-∞, ∞) ; Range [0, ∞) B) Domain (-∞, ∞) ; Range [-2, ∞)
C) Domain (-∞, ∞) ; Range [-2, 4] D) Domain (-5, 5) ; Range [-2, 8)

29) 29) _____



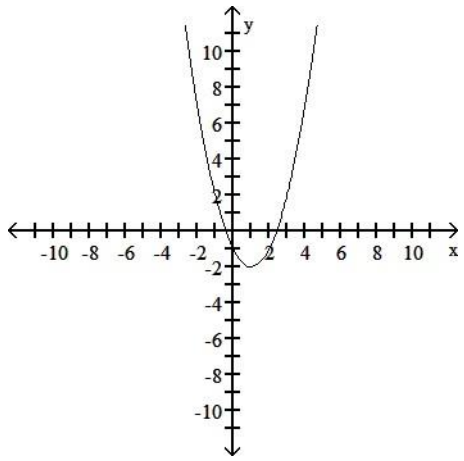
A) Domain {-8, -4, -1, 1, 4, 8} ; Range { -1, 2, 9}
B) Domain { -1, 2, 9} ; Range {-8, -4, -1, 1, 4, 8}
C) Domain [-8, 8] ; Range [-1, 9]
D) Domain [-1, 9] ; Range [-8, 8]

30) 30) _____



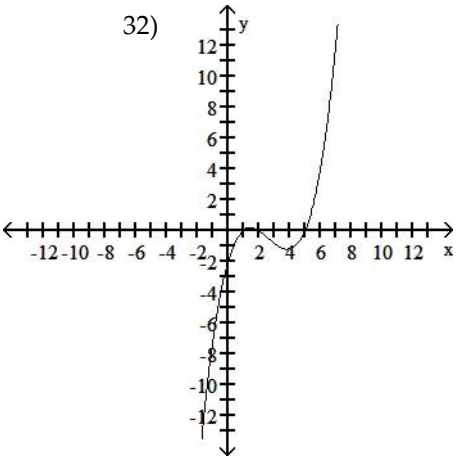
A) Domain [-4, 8] ; Range [0, 3]
B) Domain {-4, 8} ; Range { 0, 3}
C) Domain (-∞, ∞) ; Range (-∞, ∞)
D) Domain = (-4, 8) ; Range (0, 3)

31) 31) _____



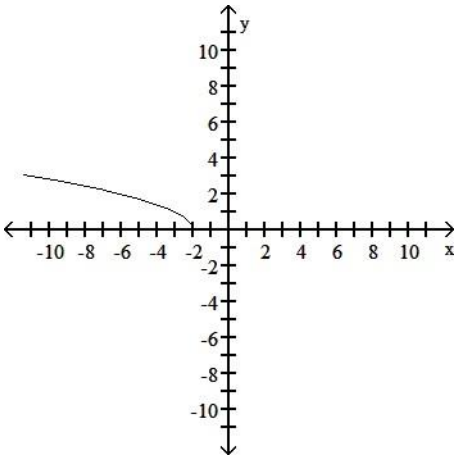
A) Domain (-∞, 0) ∪ (0, ∞) ; Range (-∞, 0) ∪ (0, ∞)
B) Domain (-∞, 0) ; Range (-∞, 0)
C) Domain (0, ∞) ; Range [3, ∞)
D) Domain (-∞, ∞) ; Range [-2, ∞)

32)

32) 

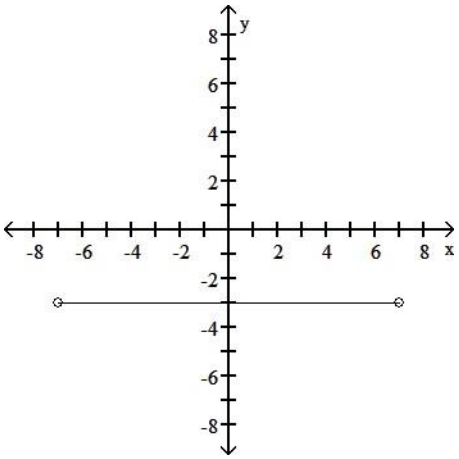
___
___

A) Domain { 5, 2, 1} ; Range (-∞, ∞)
B) Domain (-∞, ∞) ; Range { 5, 2, 1}
C) Domain (-∞, ∞) ; Range (-∞, ∞)
D) Domain (-∞, ∞) ; Range [-2, ∞)

33) 

33) _____

A) Domain (-∞, ∞) ; Range [0, ∞)
B) Domain (-∞, -2) ∪ (-2, ∞) ; Range (-∞, 0) ∪ (0, ∞)
C) Domain [0, ∞) ; Range (-∞, -2]
D) Domain (-∞, -2] ; Range [0, ∞)

34) 

34) _____

A) Domain [-7, 7] ; Range {-3}
B) Domain (-7, 7) ; Range {-3}
C) Domain (-∞, ∞) ; Range {-3}
D) Domain {-3} ; Range (-7, 7)

Evaluate the function.

35) $f(x) = x^2 - 4x + 4$; Find f(-2). 35) _____

A) 16 B) 0 C) -8 D) 8

36) $f(x) = x^2 - 5x - 5$; Find f(0). 36) _____

A) 0 B) 5 C) 25 D) -5

37) $f(x) = 5x^2 + 2x + 2$; Find f(2). 37) _____

A) 10 B) 18 C) 26 D) 22

38) $f(x) = (x - 5)(x + 2)$; Find f(-1). 38) _____

A) 4 B) -12 C) -6 D) 18

39) $f(x) = \frac{x + 7}{x - 10}$; Find f(-1). 39) _____

A) $-\frac{6}{11}$ B) $-\frac{7}{10}$ C) $-\frac{8}{9}$ D) $\frac{2}{3}$

40) $f(x) = \frac{4x}{6x + 10}$; Find f(5). 40) _____

A) $\frac{1}{4}$ B) $\frac{2}{3}$ C) $\frac{1}{2}$ D) 2

41) $f(x) = 2^{x^2} + 5x + 4$; Find f(a). 41) _____

A) 7a B) 7a + 4 C) $2^{a^2} + 5a + 4$ D) $2^{a^2} + 5a$

42) $f(x) = (x - 1)(x + 5)$; Find f(a). 42) _____

A) $a^2 - 5$ B) $a^2 + 5$ C) (a - 1)(a - 5) D) (a - 1)(a + 5)

43) $f(x) = 2x^2 + 2x - 4$; Find f(t - 1). 43) _____

A) $2t^2 - 2t - 4$ B) $2t^2 - 6t + 0$ C) $2t^2 - 2t + 0$ D) $-2t^2 + 2t - 4$

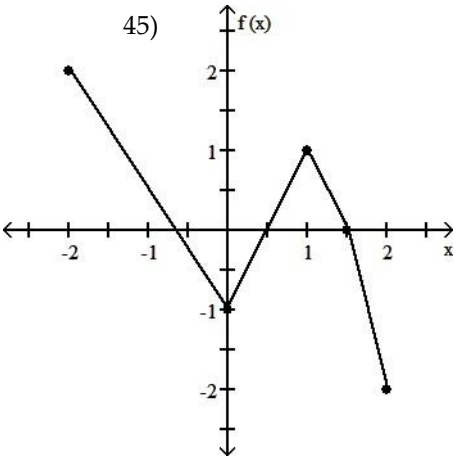
44) $f(x) = -3^{x^2} + 2x - 1$; Find f(r + h). 44) _____

A) $-3^{r^2} - 3^{h^2} + 2r + 2h - 1$ B) $-3^{r^2} - 6rh - 3^{h^2} + 2r + 2h - 1$

C) $-3^{r^2} - 3^{h^2} - 4r - 4h - 1$ D) $-3^{r^2} - 3rh - 3^{h^2} + 2r + 2h - 1$

Use the graph to evaluate the function f(x) at the indicated value of x.

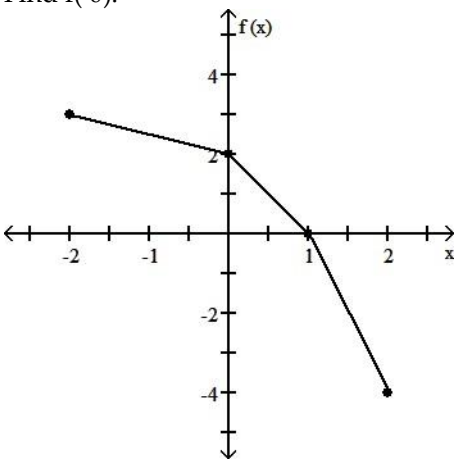
45) Find f(1).

45) 

___
___

A) 0
B) 2
C) 1
D) None of these are correct.

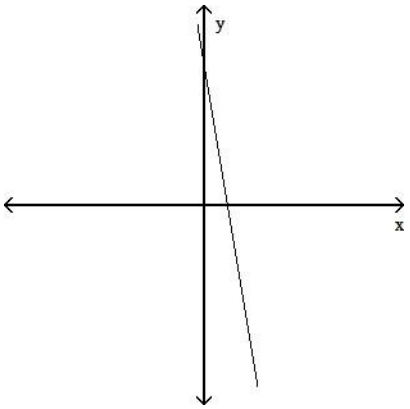
46) Find f(0). 46) _____



A) 0.5
B) 2
C) 1
D) None of these are correct.

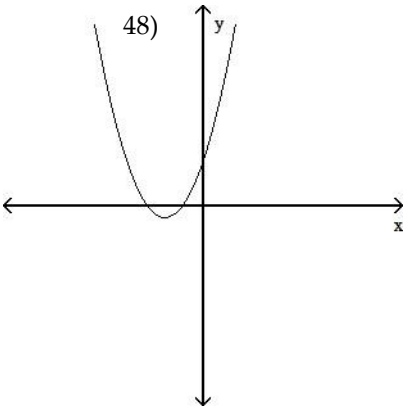
Decide whether the graph represents a function.

47) 47) _____



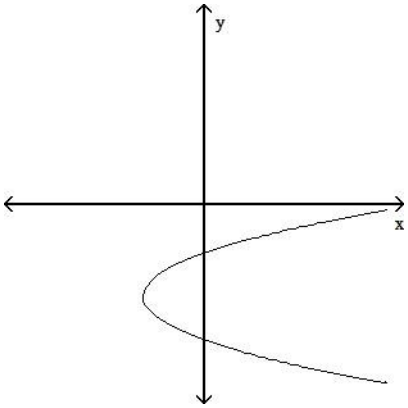
A) Function
B) Not a function

48)

48) 

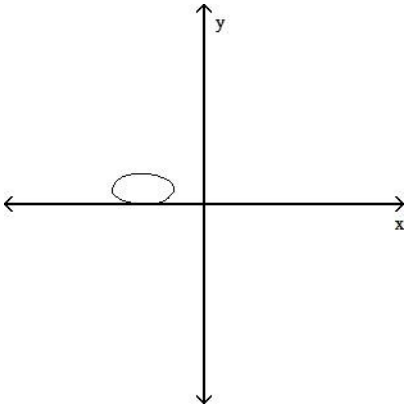
___
___

A) Function B) Not a function

49) 

49) _____

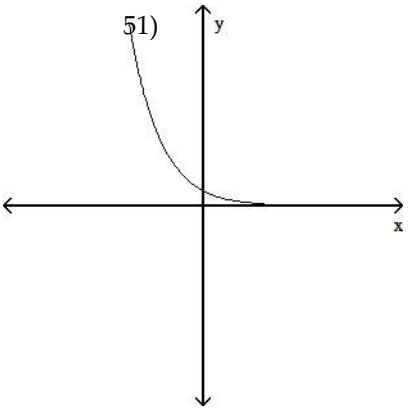
A) Function B) Not a function

50) 

50) _____

A) Function B) Not a function

51)

51) 

___
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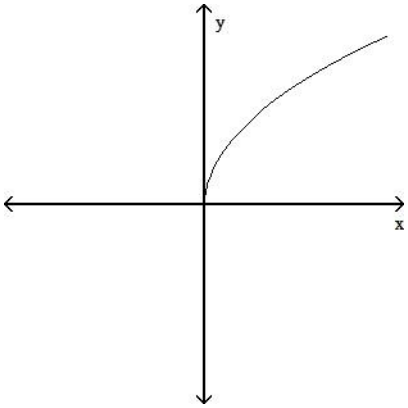
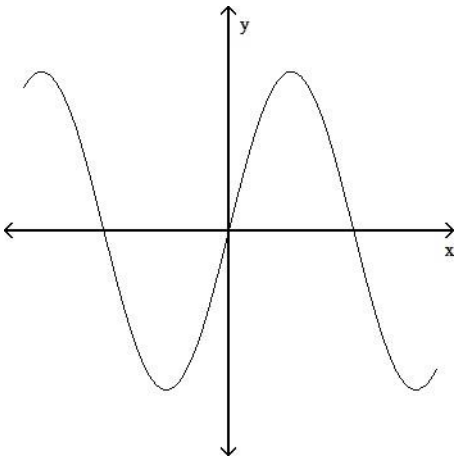
A) Function B) Not a function

52) 

52) _____

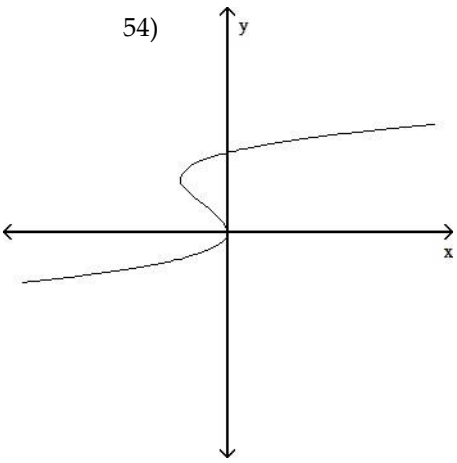
A) Function B) Not a function

53) 

53) _____

A) Function B) Not a function

54)

54) 

___
___

A) Function B) Not a function

Find $\frac{f(x+h)-f(x)}{h}$.

55) f(x) = $10x - 14$ 55) _____

A) $\frac{7}{5}$ B) 14 C) 10 D) -10h

56) f(x) = $8^{x^2} + 15x - 4$ 56) _____

A) $16xh + 15h + 15h^2$ B) $8x + 6 + 16h$

C) $16x + 15$ D) $16x + 15 + 8h$

57) $f(x) = \frac{14}{x+22}$ 57) _____

A) $\frac{-14}{(x+h+22)(x+22)}$ B) $\frac{-308}{(x+h+22)(x+22)}$

C) $\frac{-14}{(x+14)^2}$ D) $\frac{14}{(x+h+22)(x+22)}$

58) f(x) = $10 - 8^{x^3}$ 58) _____

A) $-8(3^{x^2} + 3xh + h^2)$ B) -3^{x^2}

C) $-8(3^{x^2} - 3x - h)$ D) $-8(^{x^2} - xh - h^2)$

59) $f(x) = \frac{5}{x}$ 59) _____

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

60) $f(x) = \frac{2}{x^2}$ 60) _____

A) $-\frac{4x+2h}{x^2(x^2+2hx+h^2)}$ B) $-\frac{2}{(x+h)}$

C) $\frac{h}{x-h}$ D) $-\frac{h}{x(x+h)}$

Classify the function as even, odd, or neither.

61) $f(x) = 4x$ 61) _____

A) Even B) Odd C) Neither

62) $f(x) = 3^{x^2}$ 62) _____

A) Even B) Odd C) Neither

63) $f(x) = 3^{x^3}$ 63) _____

A) Even B) Odd C) Neither

64) $f(x) = 2^{x^4} - x^2$ 64) _____

A) Even B) Odd C) Neither

65) $f(x) = -4^{x^2} + 7$ 65) _____

A) Even B) Odd C) Neither

66) $f(x) = 9^{x^3} - 4$ 66) _____

A) Even B) Odd C) Neither

67) $f(x) = \frac{1}{x^2}$ 67) _____

A) Even B) Odd C) Neither

68) $f(x) = \frac{x}{x^2 - 3}$ 68) _____

A) Even B) Odd C) Neither

69) $f(x) = -4^{x^3} + 6x$ 69) _____

A) Even B) Odd C) Neither

70) $f(x) = |x^2 + x|$ 70) _____

A) Even B) Odd C) Neither

Solve the problem.

71) The table shows the estimated number of pounds of summer flounder harvested in North Carolina each year from 1992-1998. Let y = f(x) represent the number of flounder (in millions of pounds) and x represent the years. What is the dependent variable? 71) _____

Year	Millions of lb of Summer Flounder
1992	2.6
1993	3.1
1994	3.6
1995	4.6
1996	4.2
1997	1.5
1998	3.0

A) The number of hurricanes striking the N.C. coast in the given year

B) Millions of pounds of flounder
C) Years
D) None of these are correct.

72) A state park charges $15 per day or fraction of a day to rent a tent site, plus a fixed $4 park maintenance fee. Let T(x) represent the cost to stay in a tent site for x days. Find $T\left(10\frac{1}{2}\right)$. 72) _____

A) $ 169.00 B) $ 161.50 C) $ 150.00 D) $ 154.00

73) A hummingbird adds 12 grams per day to its base body weight of 4 grams during the spring migration. Let T(x) represent the hummingbird's weight after x days. Find $T\left(9\frac{1}{2}\right)$. 73) _____

A) 124 g B) 118.00 g C) 112 g D) 108 g

74) Sue wants to put a rectangular garden on her property using 72 meters of fencing. There is a river that runs through her property so she decides to increase the size of the garden by using the river as one side of the rectangle. (Fencing is then needed only on the other three sides.) Let x represent the length of the side of the rectangle along the river. Express the garden's area as a function of x. 74) _____

A) $A(x) = 35x - \frac{1}{4}x^2$
B) $A(x) = 36^{x^2} - x$
C) $A(x) = 36x - \frac{1}{2}x^2$
D) $A(x) = 37x - 2^{x^2}$

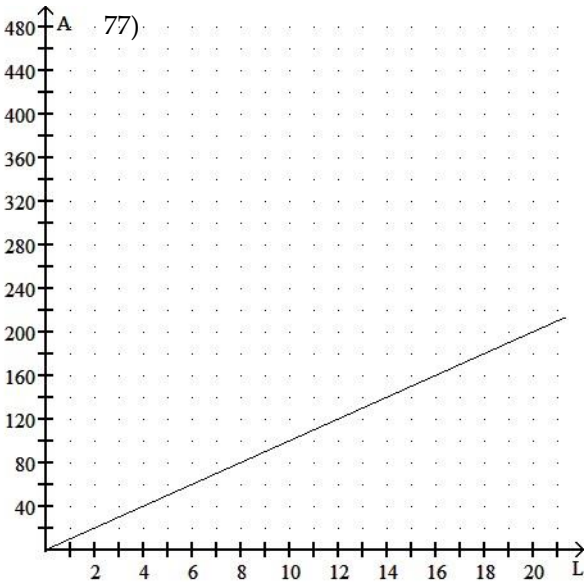
75) A farmer has 1600 yards of fencing to enclose a rectangular garden. Express the area A of the rectangle as a function of the width x of the rectangle. What is the domain of A? 75) _____

A) $A(x) = -x^2 + 1600x; \{x|0 < x < 1600\}$
B) $A(x) = -x^2 + 800x; \{x|0 < x < 1600\}$
C) $A(x) = x^2 + 800x; \{x|0 < x < 800\}$
D) $A(x) = -x^2 + 800x; \{x|0 < x < 800\}$

76) Suppose a life insurance policy costs $ 12 for the first unit of coverage and then $ 3 for each additional unit of coverage. Let C(x) be the cost for insurance of x units of coverage. What will 10 units of coverage cost? 76) _____

A) $ 18 B) $ 42 C) $ 30 D) $ 39

77) The graph shows the relationship between the area A of a rectangle and the length L, if the width is fixed. Find the area if the length is 12 cm.

77) 

A) 140 cm^2 B) 120 cm^2 C) 90 cm^2 D) 100 cm^2

78) The territorial area of an animal is defined to be its defended region, or exclusive region. For example, a rhinoceros has a certain region over which it is ruler. The area T of that region, in acres, can be approximated by the function

$T = W^{1.43}$,

where W is the weight of the animal, in tons. Find the approximate territorial area of a rhinoceros who weights 4.1 tons. Round to the nearest hundredth. 78) _____

A) 7.52 acres B) 4.33 acres C) 0.23 acres D) 0.13 acres

79) When pouring water from one five gallon bucket to another, a person tends to pour at a faster rate at first and then slow down in order not to spill. The amount of water left in the original bucket can be approximated by

$f(t) = 5 - 0.82t^{0.62}$,

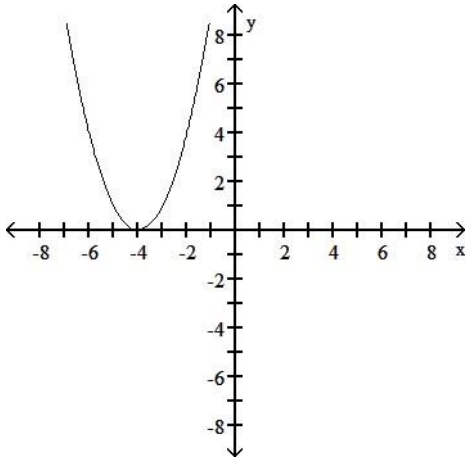
where f(t) is measured in gallons and t is the time spent pouring in seconds. Find the approximate amount of water left in the original bucket after 6 seconds of pouring. Round to the nearest hundredth. 79) _____

A) 2.51 gal B) 4.38 gal C) 2.49 gal D) 4.18 gal

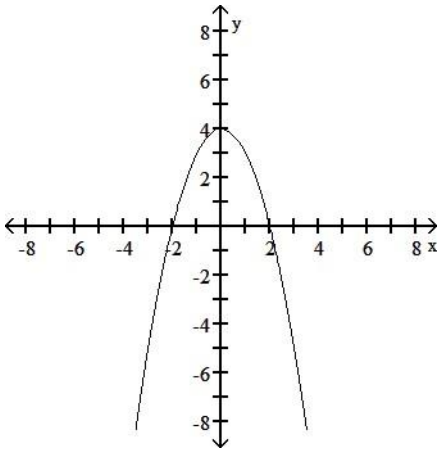
Match the correct graph to the given function.

80) $y = x^2 - 4$ 80) _____

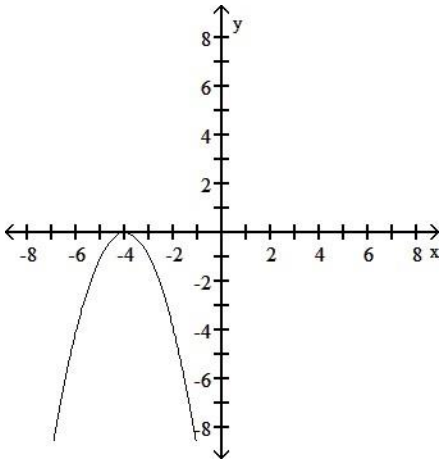
A)



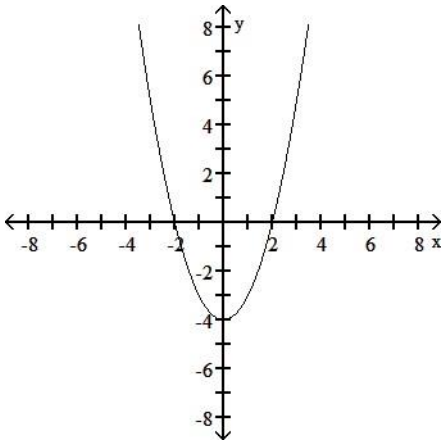
B)



C)

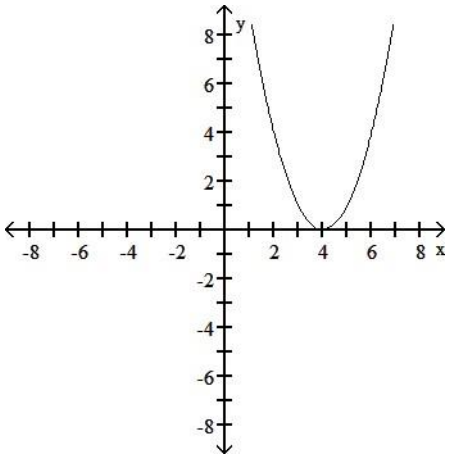


D)

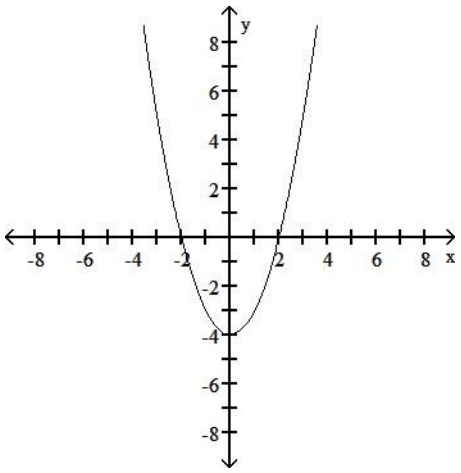


81) $y = x^2 + 4$ 81) _____

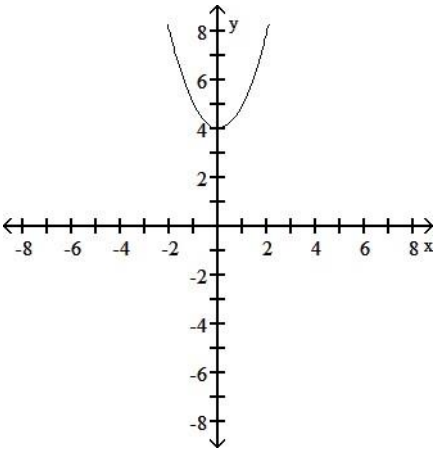
A)



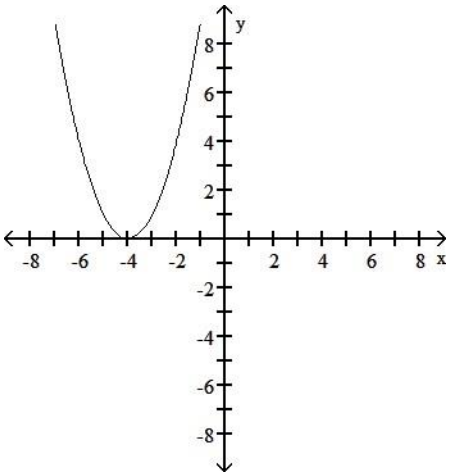
B)



C)

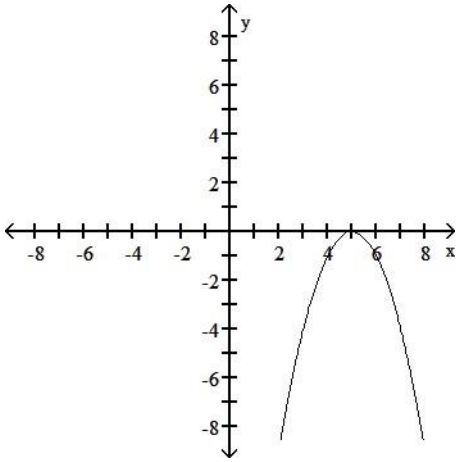


D)

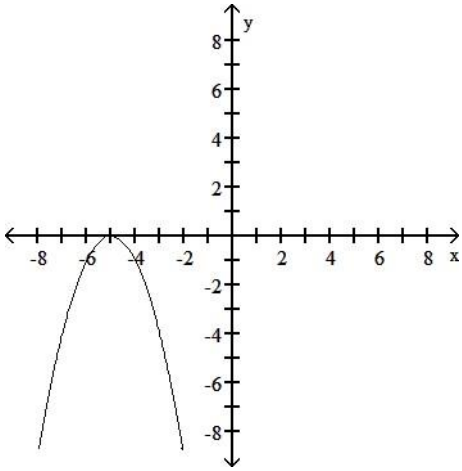


82) $y = (x + 5)^2$ 82) _____

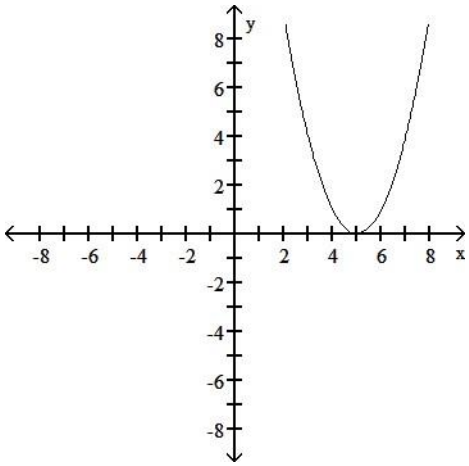
A)



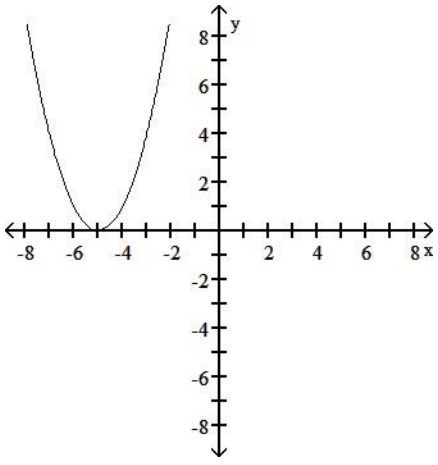
B)



C)

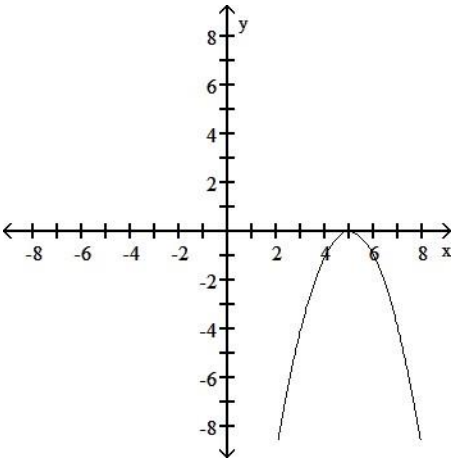


D)

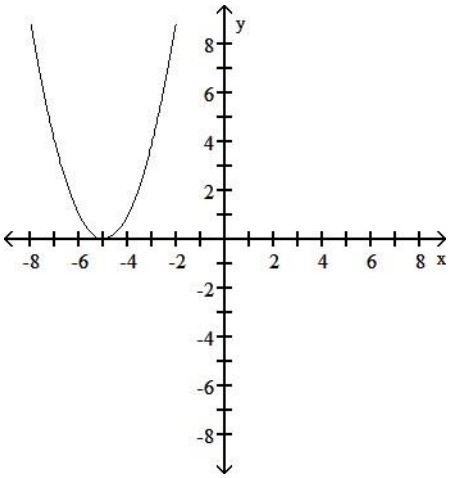


83) $y = (x - 5)^2$ 83) _____

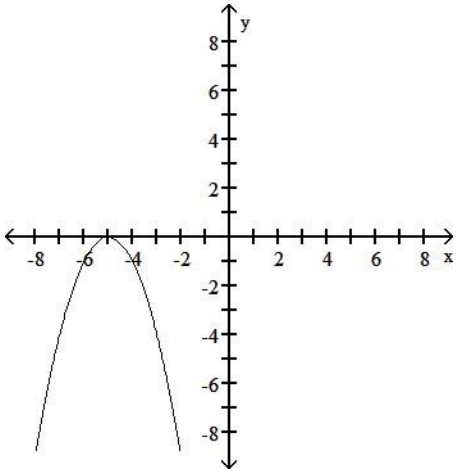
A)



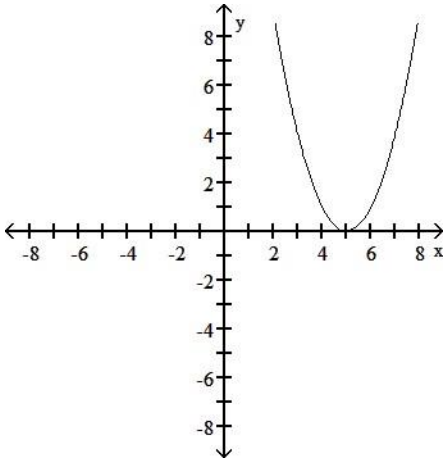
B)



C)

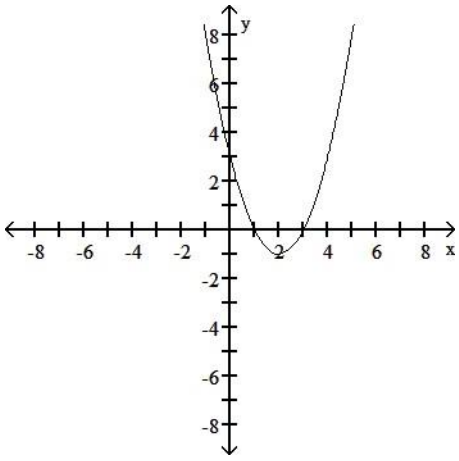


D)

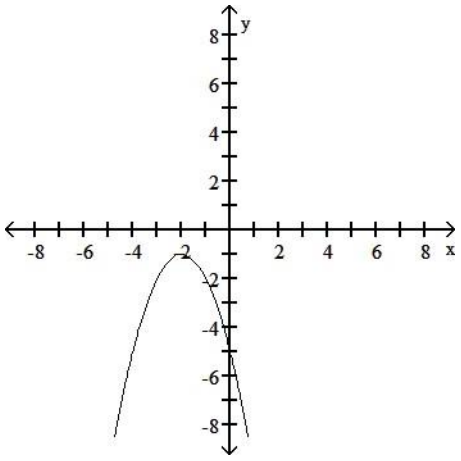


84) $y = (x - 2)^2 - 1$ 84) _____

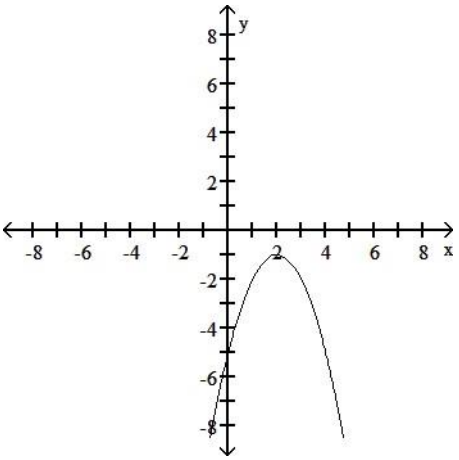
A)



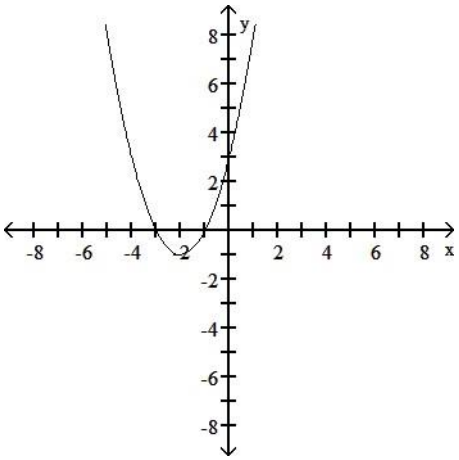
B)



C)

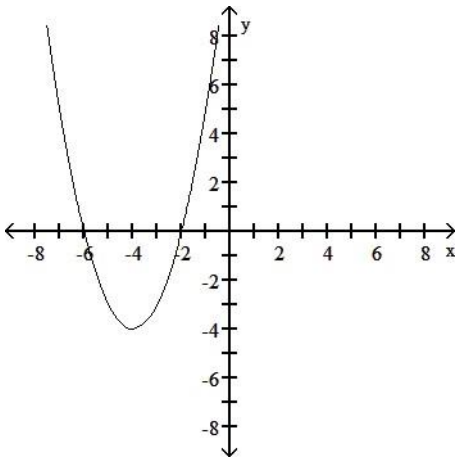


D)

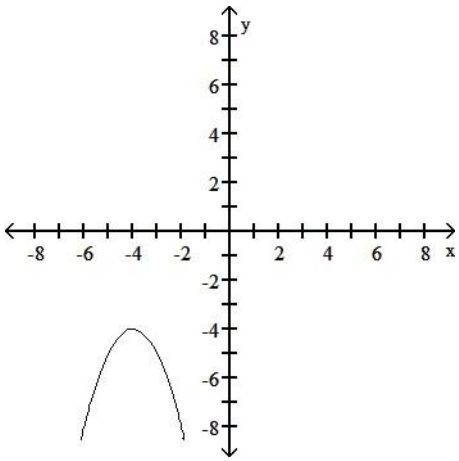


85) $y = -(x - 4)^2 - 4$ 85) _____

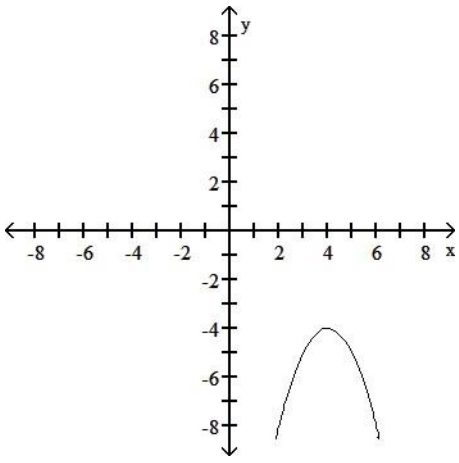
A)



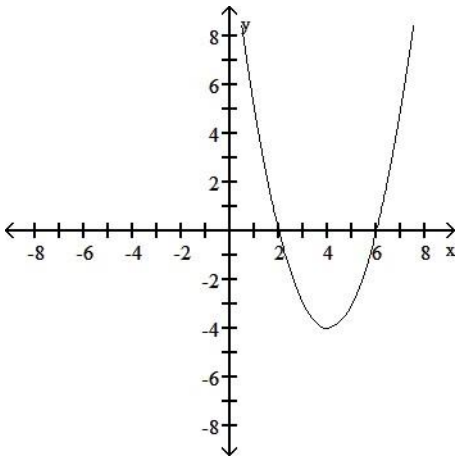
B)



C)

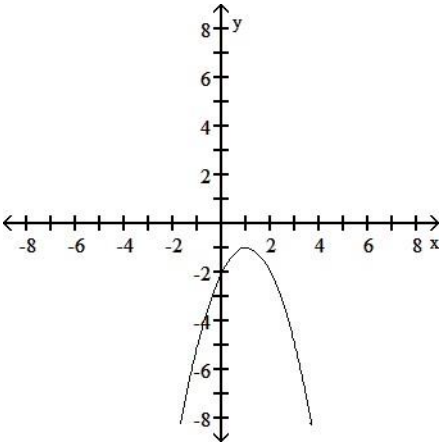


D)

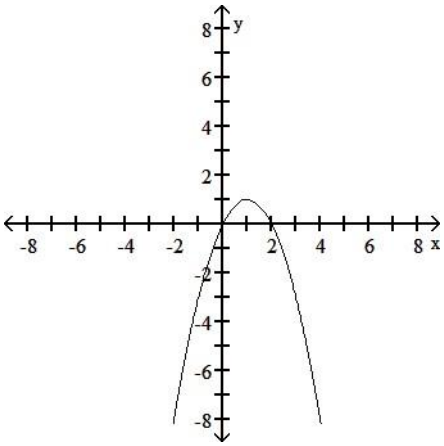


86) $y = -(1 - x)^2 + 1$ 86) _____

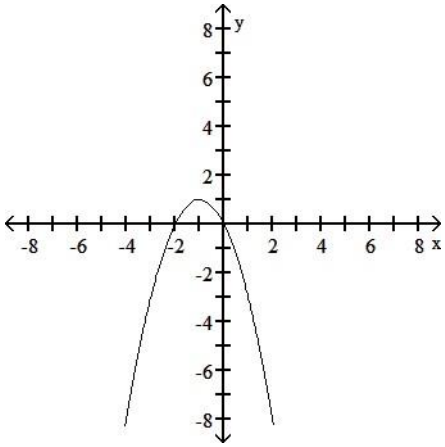
A)



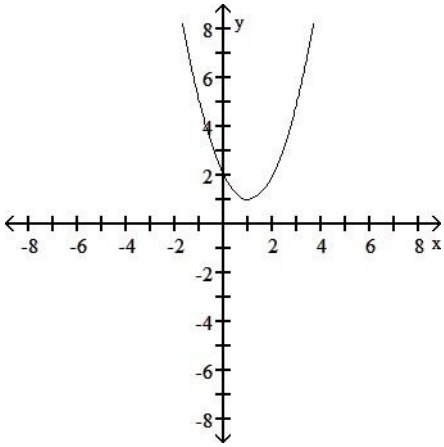
B)



C)

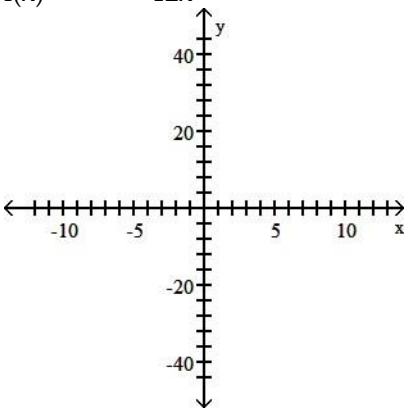


D)

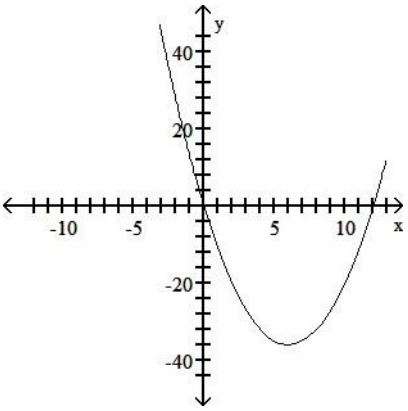


Graph the parabola and give its vertex, axis, x-intercepts, and y-intercepts.

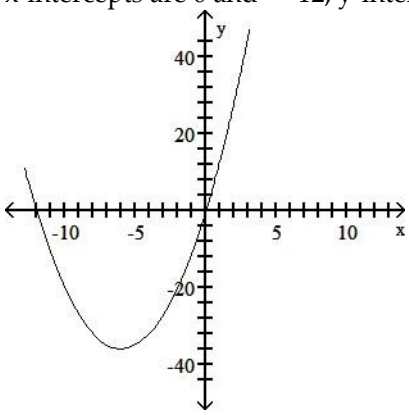
87) $f(x) = x^2 + 12x$ 87) _____



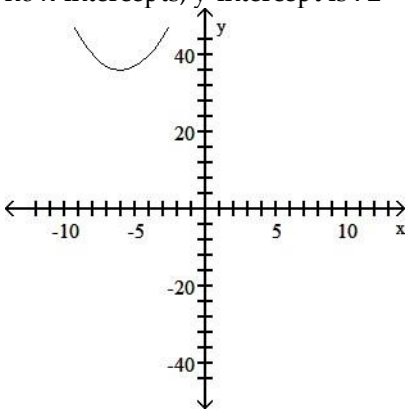
A) vertex (6, -36); axis is x = 6;
x-intercepts are 0 and 12; y-intercept is 0



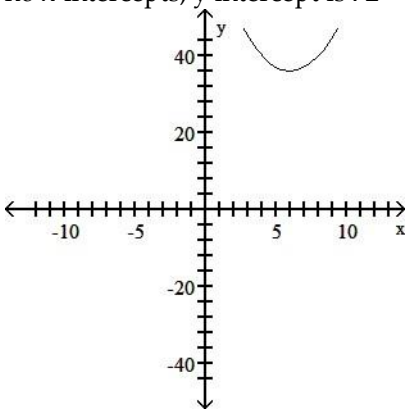
B) vertex (-6, -36); axis is x = -6;
x-intercepts are 0 and - 12; y-intercept is 0



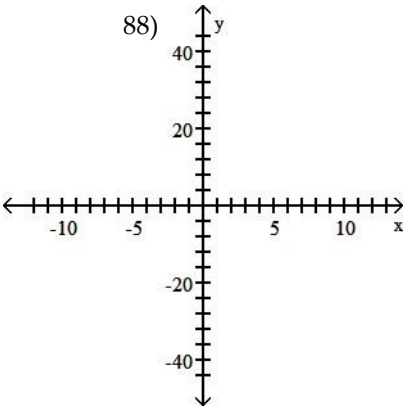
C) vertex (-6, 36); axis is x = -6;
no x-intercepts; y-intercept is 72



D) vertex (6, 36); axis is x = 6;
no x-intercepts; y intercept is 72

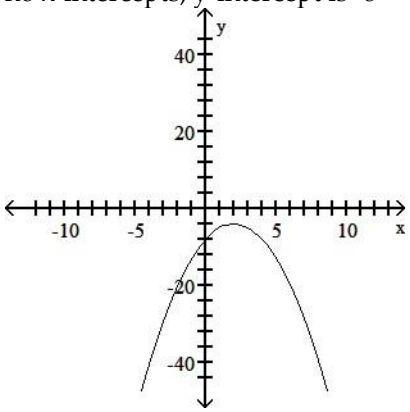


88) $f(x) = -x^2 - 4x$

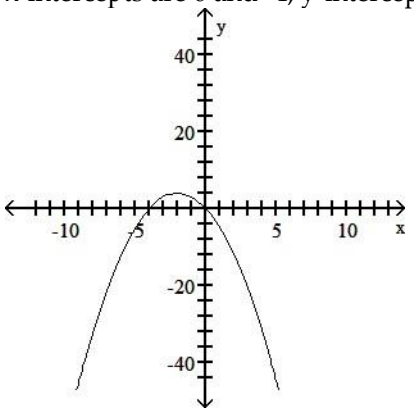
88) 

___
___

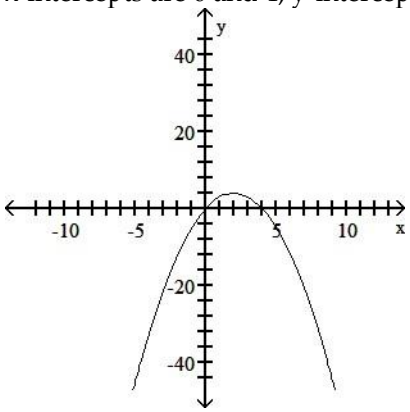
A) vertex (2, -4); axis is x = 2;
no x-intercepts; y-intercept is -8



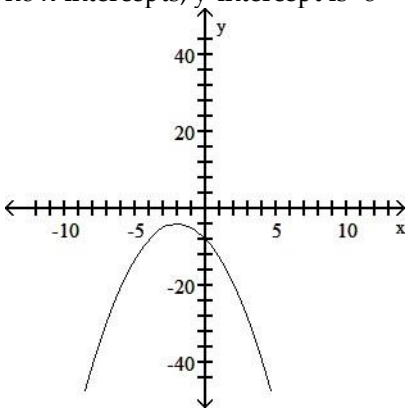
B) vertex (-2, 4); axis is x = -2;
x-intercepts are 0 and -4; y-intercept is 0



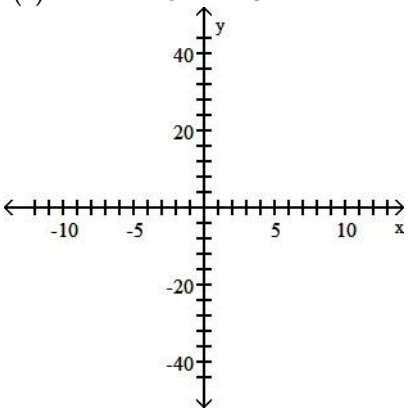
C) vertex (2, 4); axis is x = 2;
x-intercepts are 0 and 4; y-intercept is 0



D) vertex (-2, -4); axis is x = -2;
no x-intercepts; y-intercept is -8

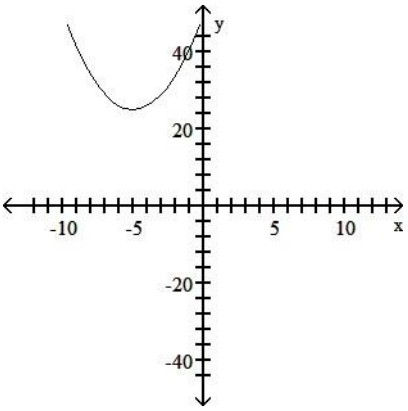


89) f(x) = x^2 + 10x + 25 89) _____

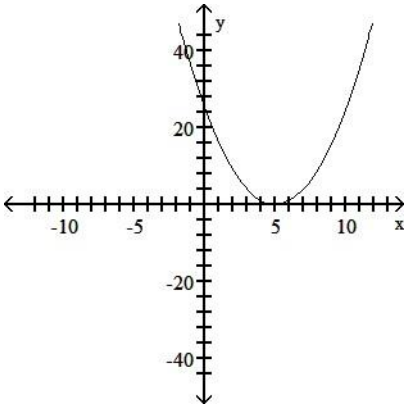


A) vertex (-5, 25); axis is x = -5;

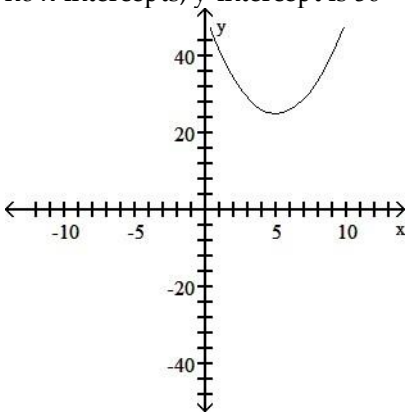
no x-intercepts; y-intercept is 50



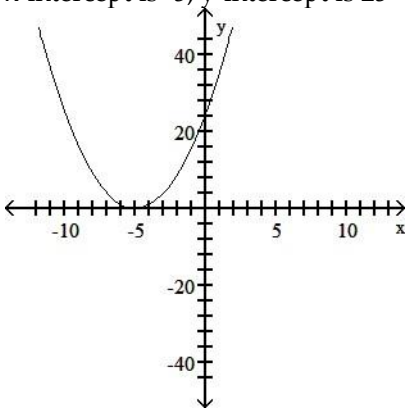
B) vertex (5, 0); axis is x = 5; x-intercept is 5; y-intercept is 25



C) vertex (5, 25); axis is x = 5;
no x-intercepts; y-intercept is 50

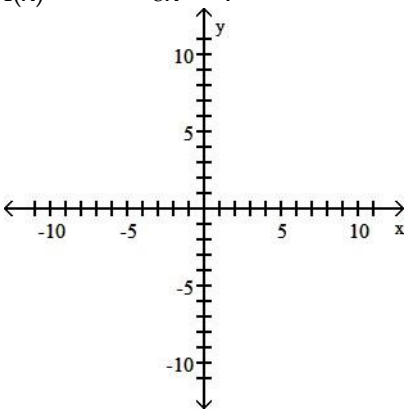


D) vertex (-5, 0); axis is x = -5;
x-intercept is -5; y-intercept is 25

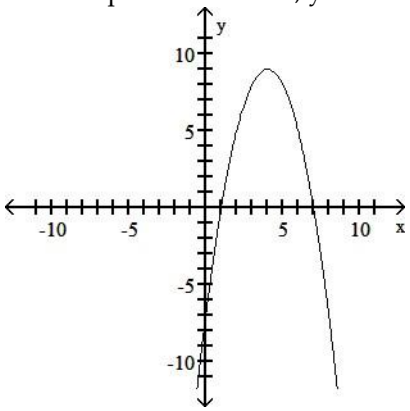


90) f(x) = x^2 + 8x + 7

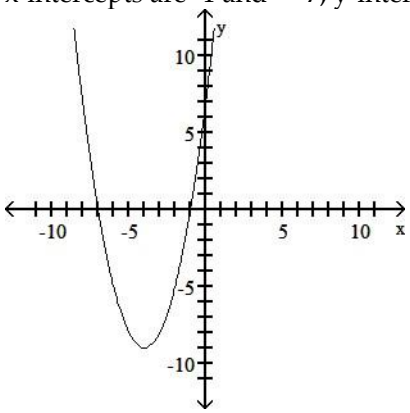
90) _____



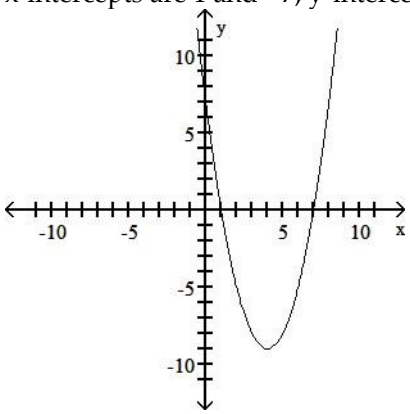
A) vertex (4, 9); axis is x = 4;
x-intercepts are 1 and 7; y-intercept is -7



B) vertex (-4, -9); axis is x = -4;
x-intercepts are -1 and - 7; y-intercept is 7

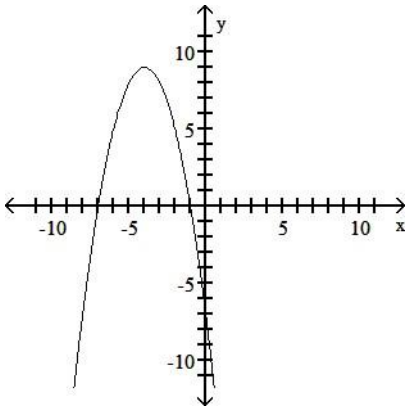


C) vertex (4, -9); axis is x = 4;
x-intercepts are 1 and 7; y-intercept is 7

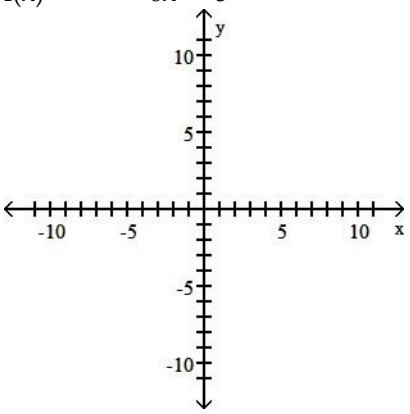


D) vertex (-4, 9); axis is x = -4;

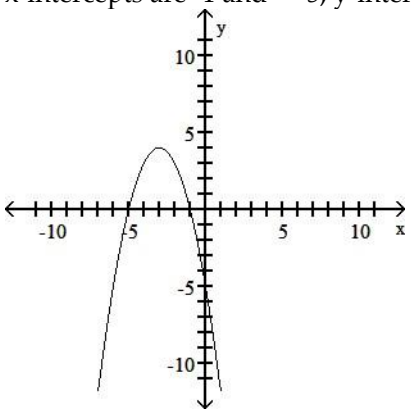
x-intercepts are -1 and - 7; y-intercept is -7



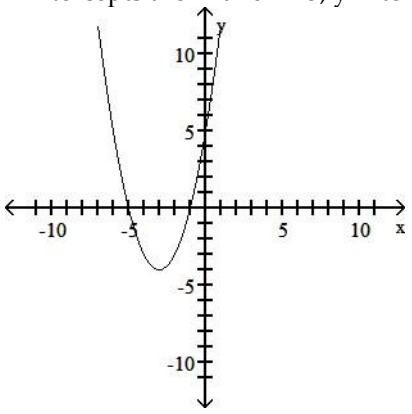
91) $f(x) = -x^2 - 6x - 5$ 91) _____



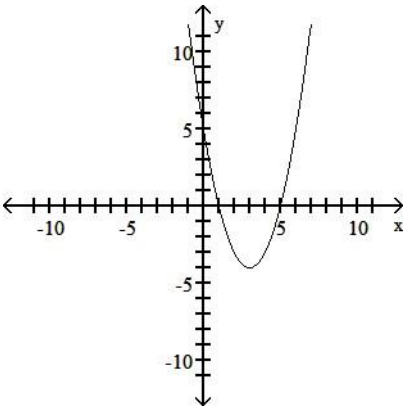
A) vertex (-3, 4); axis is x = -3;
x-intercepts are -1 and - 5; y-intercept is -5



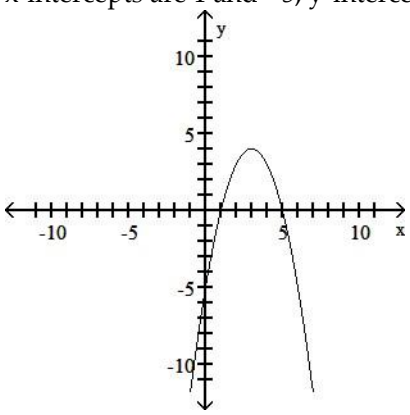
B) vertex (-3, -4); axis is x = -3;
x-intercepts are -1 and - 5; y-intercept is 5



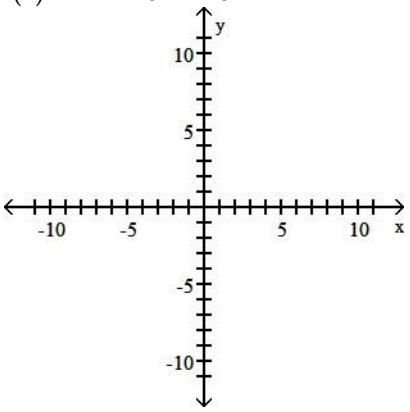
C) vertex (3, -4); axis is x = 3;
x-intercepts are 1 and 5; y-intercept is 5



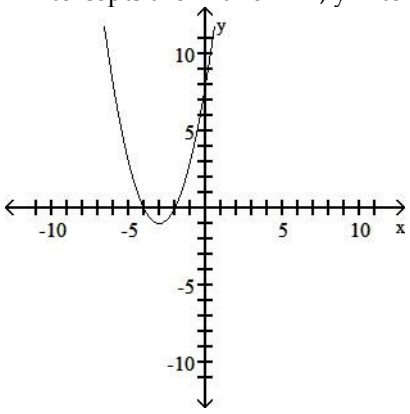
D) vertex (3, 4); axis is x = 3;
x-intercepts are 1 and 5; y-intercept is -5



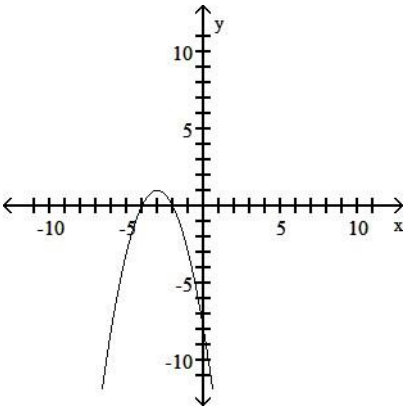
92) $f(x) = x^2 - 6x + 8$ 92) _____



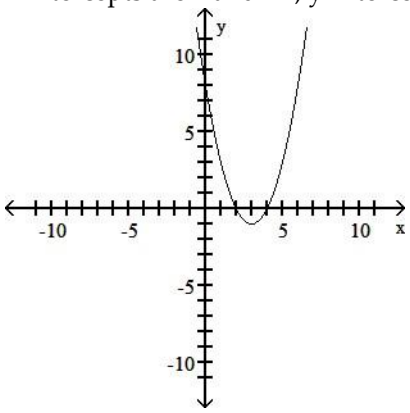
A) vertex (-3, -1); axis is x = -3;
x-intercepts are -4 and - 2; y-intercept is 8



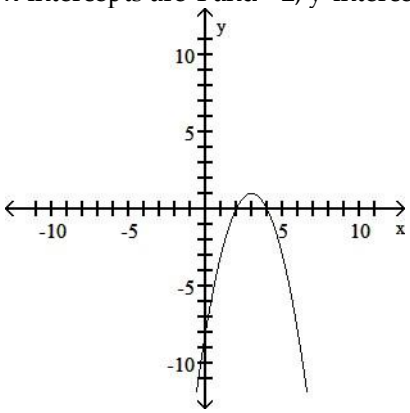
B) vertex (-3, 1); axis is x = -3;
x-intercepts are -4 and - 2; y-intercept is -8



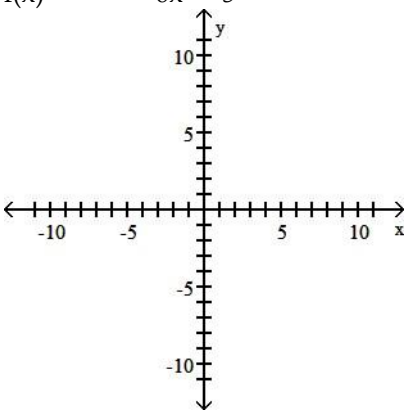
C) vertex (3, -1); axis is x = 3;
x-intercepts are 4 and 2; y-intercept is 8



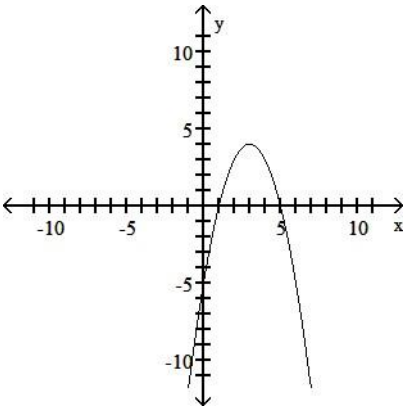
D) vertex (3, 1); axis is x = 3;
x-intercepts are 4 and 2; y-intercept is -8



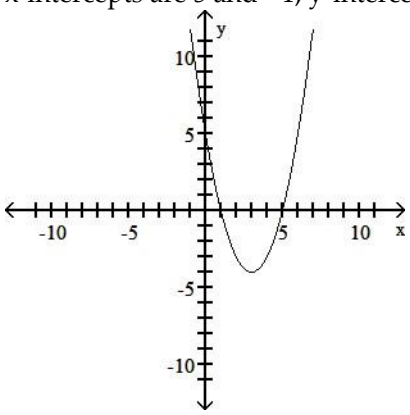
93) $f(x) = -x^2 + 6x - 5$ 93) _____



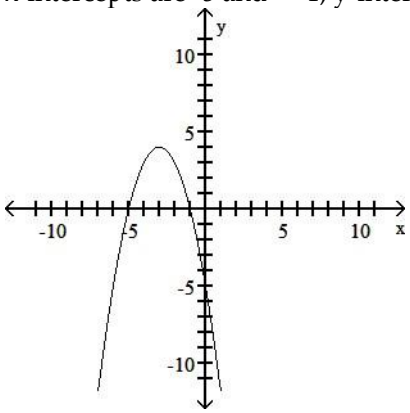
A) vertex (3, 4); axis is x = 3;
x-intercepts are 5 and 1; y-intercept is -5



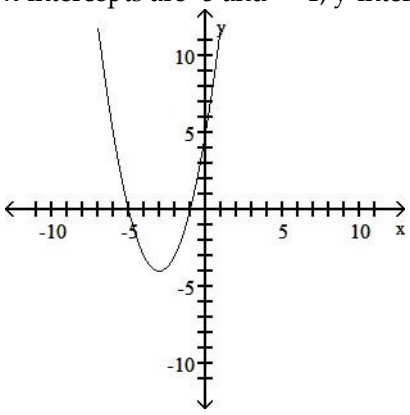
B) vertex (3, -4); axis is x = 3;
x-intercepts are 5 and 1; y-intercept is 5



C) vertex (-3, 4); axis is x = -3;
x-intercepts are -5 and - 1; y-intercept is -5

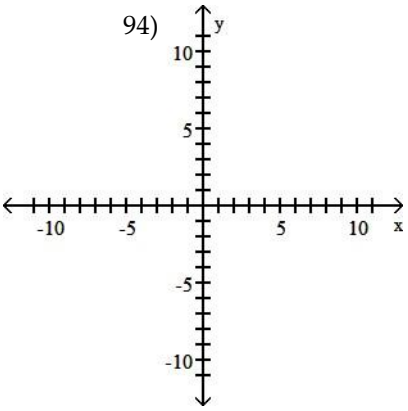


D) vertex (-3, -4); axis is x = -3;
x-intercepts are -5 and - 1; y-intercept is 5

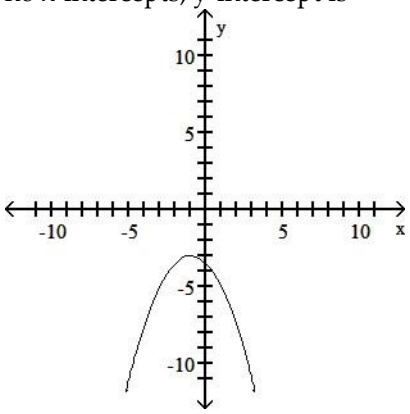


94) f(x) = $-2x^2 - 4x - 5$

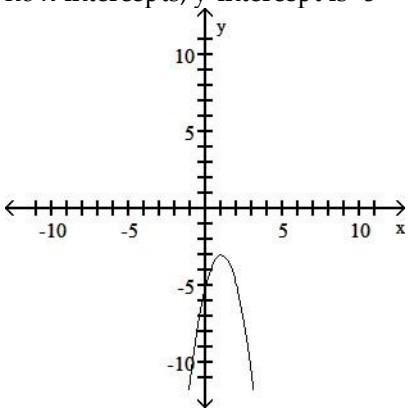
94)



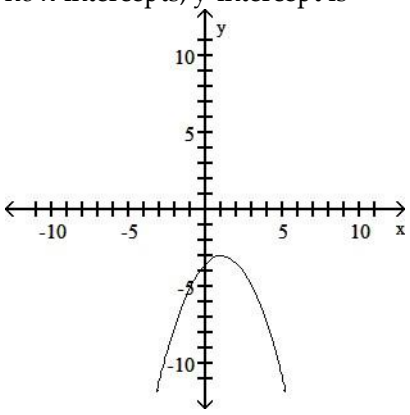
A) vertex (-1, -3); axis is x = -1;
no x-intercepts; y-intercept is $-\frac{7}{2}$



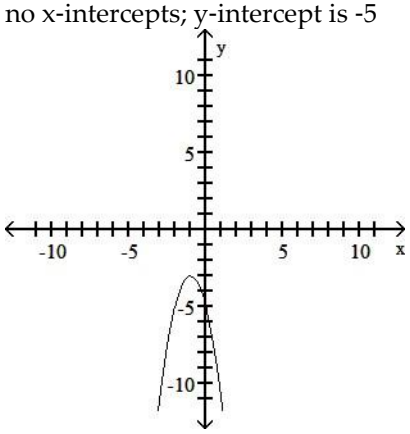
B) vertex (1, -3); axis is x = 1;
no x-intercepts; y-intercept is -5



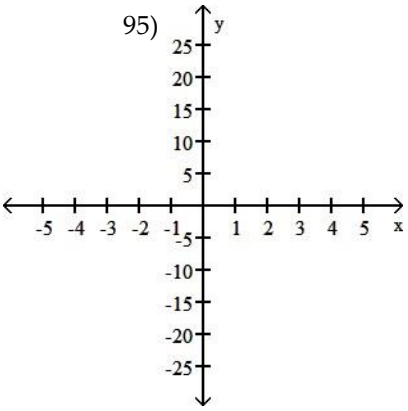
C) vertex (1, -3); axis is x = 1;
no x-intercepts; y-intercept is $-\frac{7}{2}$



D) vertex (-1, -3); axis is x = -1;
no x-intercepts; y-intercept is -5

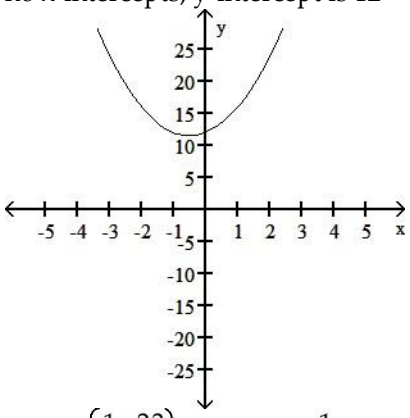


95) $f(x) = -2^{x^2} - 2x - 12$

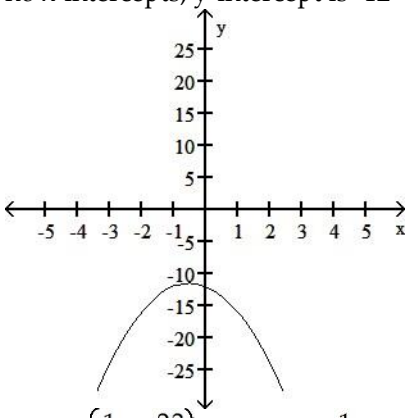
95) 

___
___

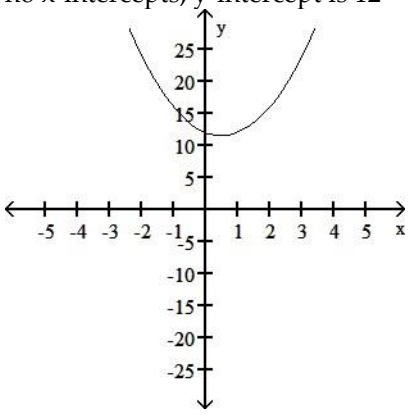
A) vertex $\left(-\frac{1}{2}, \frac{23}{2}\right)$; axis is x = $-\frac{1}{2}$;
no x-intercepts; y-intercept is 12



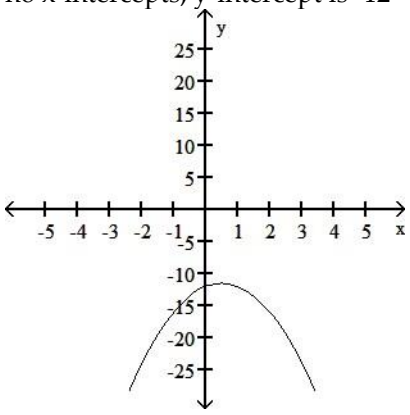
B) vertex $\left(-\frac{1}{2}, -\frac{23}{2}\right)$; axis is x = $-\frac{1}{2}$;
no x-intercepts; y-intercept is -12



C) vertex $\left(\frac{1}{2}, \frac{23}{2}\right)$; axis is x = $\frac{1}{2}$;
no x-intercepts; y-intercept is 12



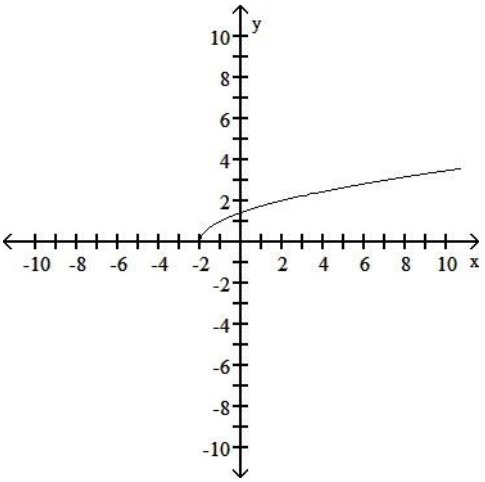
D) vertex $\left(\frac{1}{2}, -\frac{23}{2}\right)$; axis is x = $\frac{1}{2}$;
no x-intercepts; y-intercept is -12



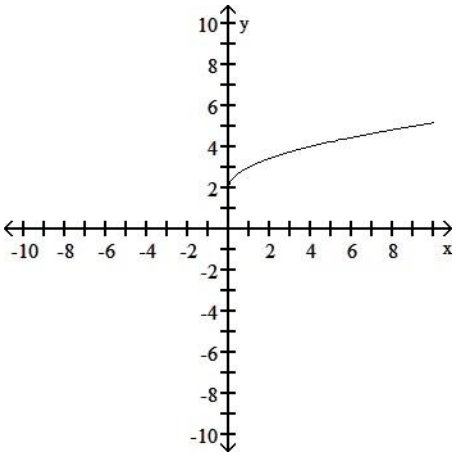
Match the correct graph to the given function.

96) $y = \sqrt{x} - 2$ 96) _____

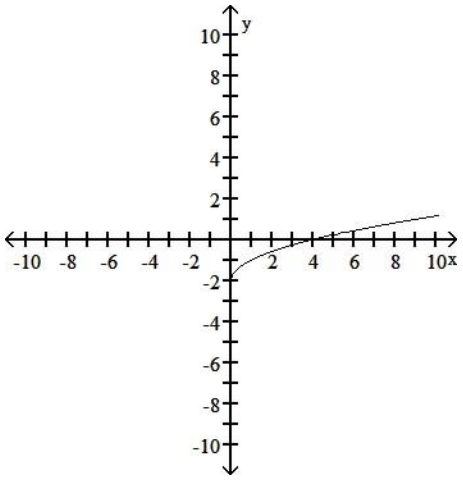
A)



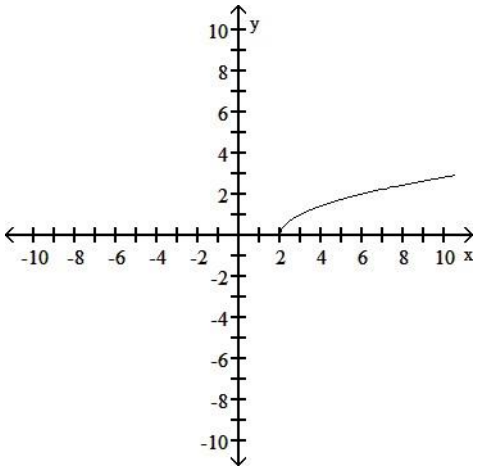
B)



C)

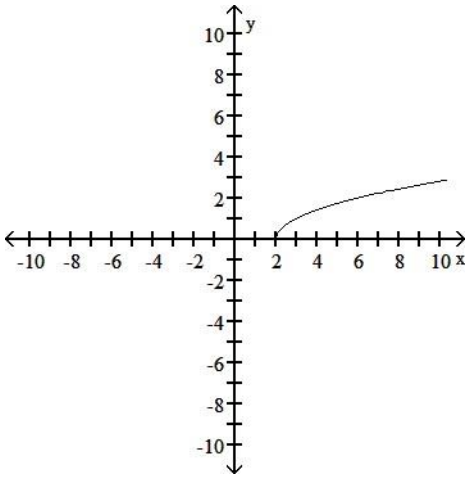


D)

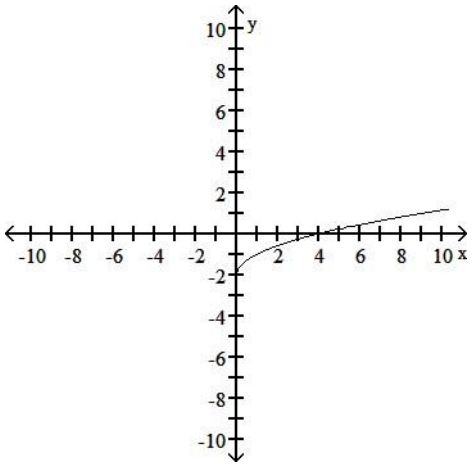


97) $y = \sqrt{x + 2}$ 97) _____

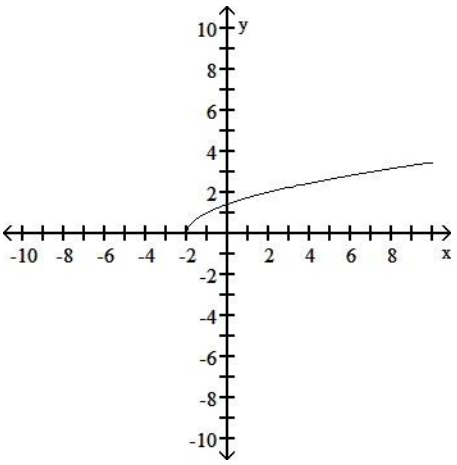
A)



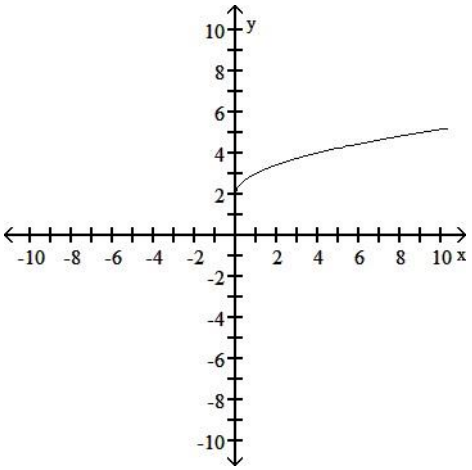
B)



C)

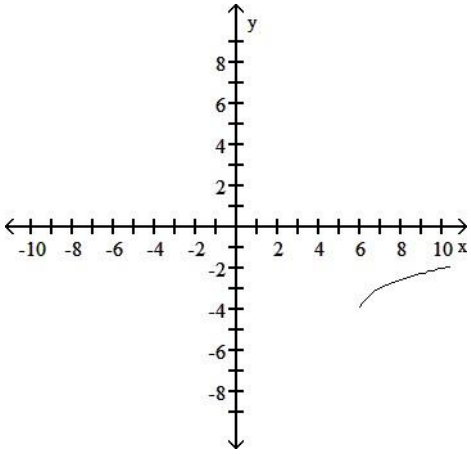


D)

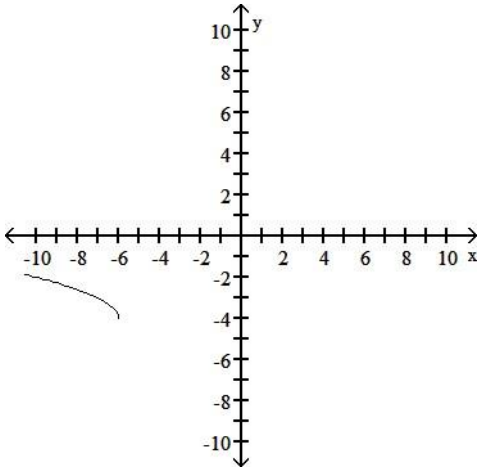


98) $y = \sqrt{x - 6} - 4$ 98) _____

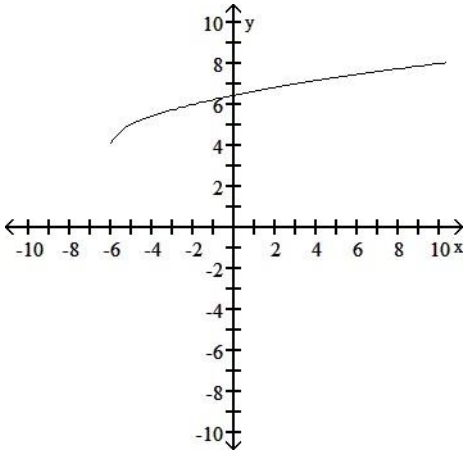
A)



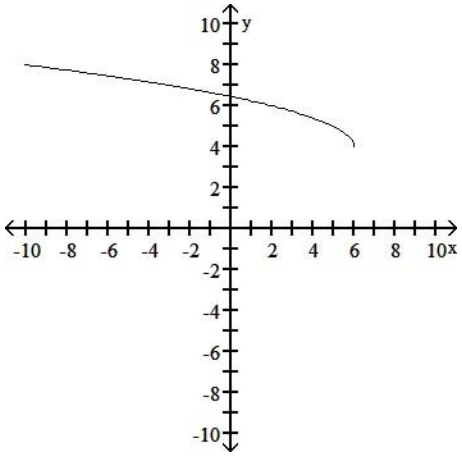
B)



C)

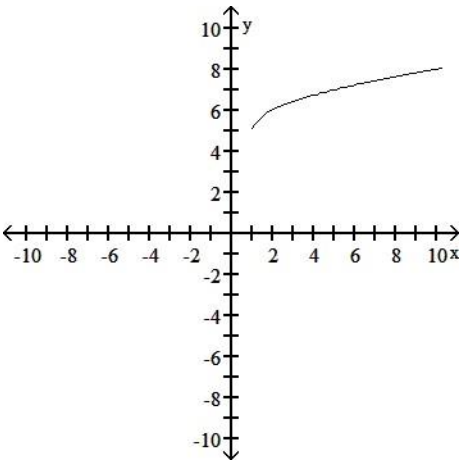


D)

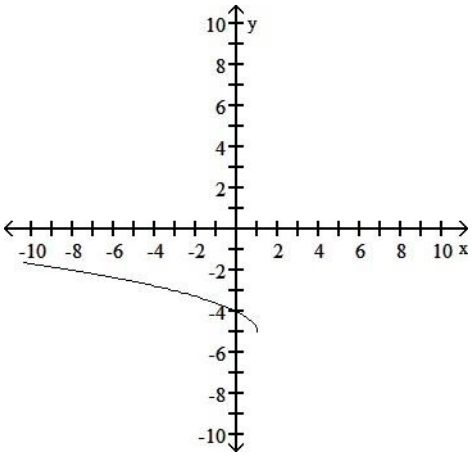


99) $y = \sqrt{x - 1} + 5$ 99) _____

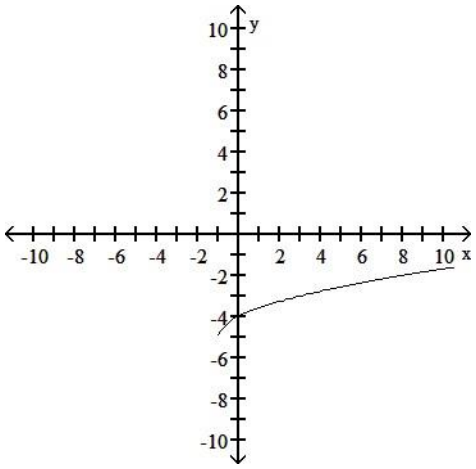
A)



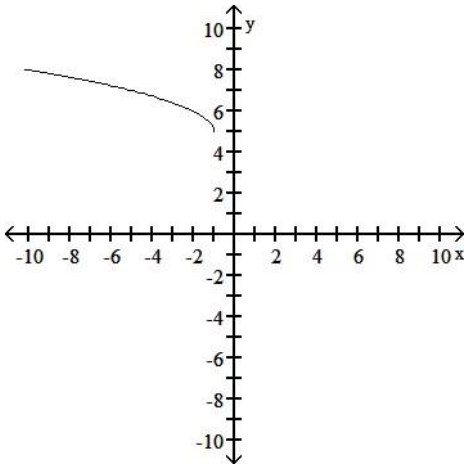
B)



C)



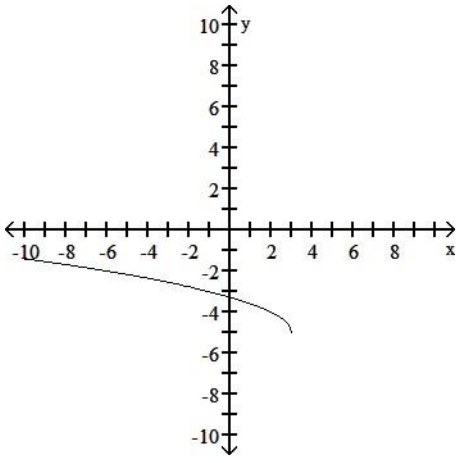
D)



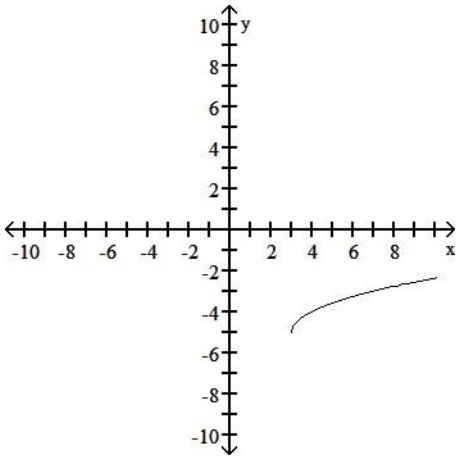
100) $y = \sqrt{-x + 3} - 5$

100) _____

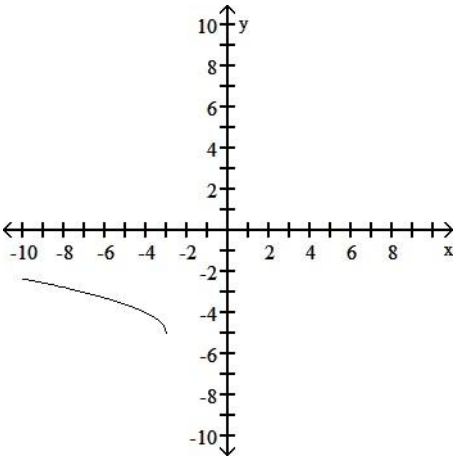
A)



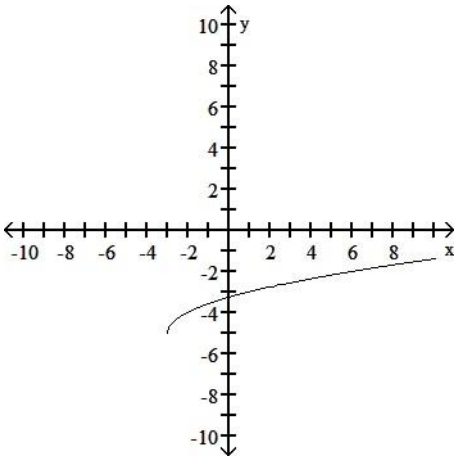
B)



C)

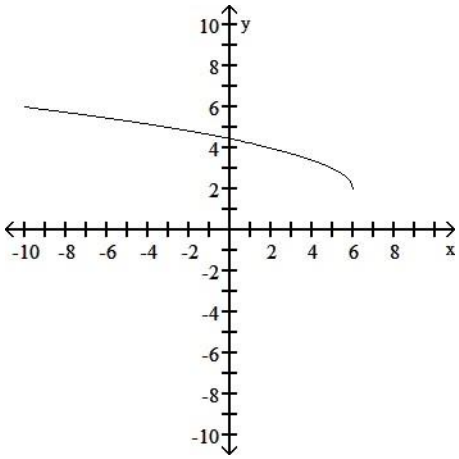


D)

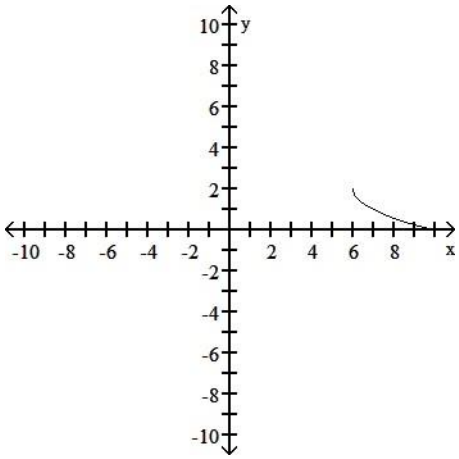


101) $y = -\sqrt{x + 6} + 2$ 101) _____

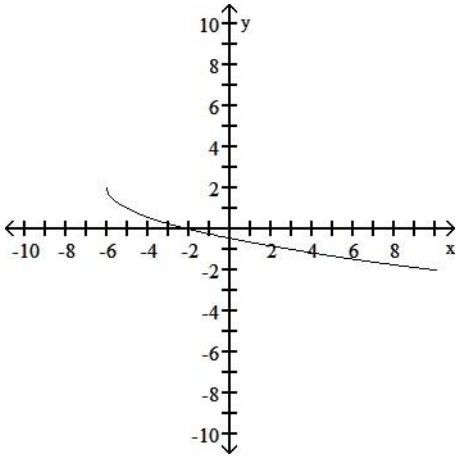
A)



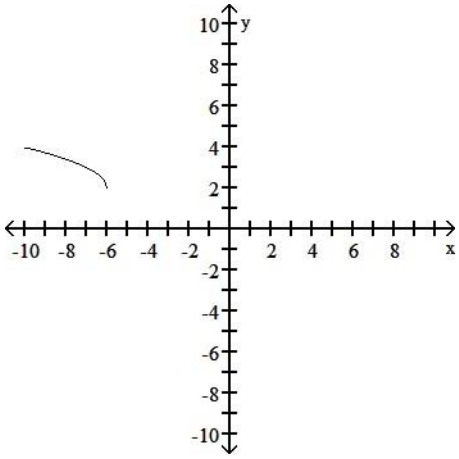
B)



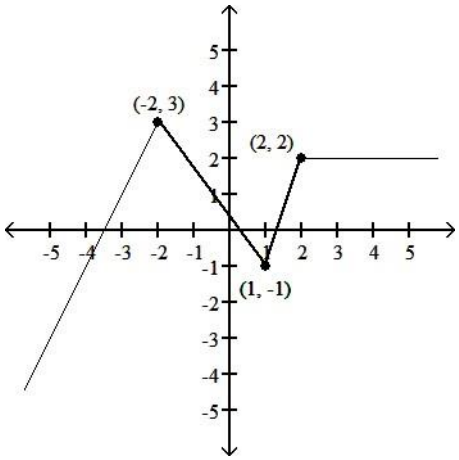
C)



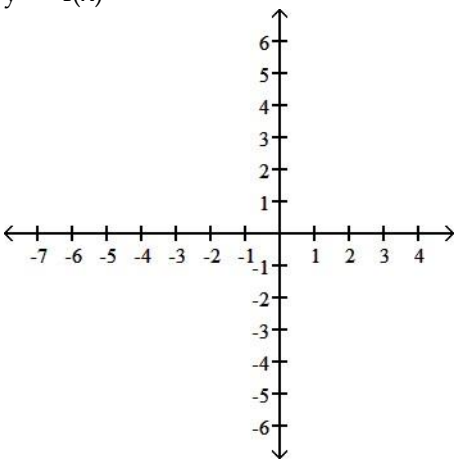
D)



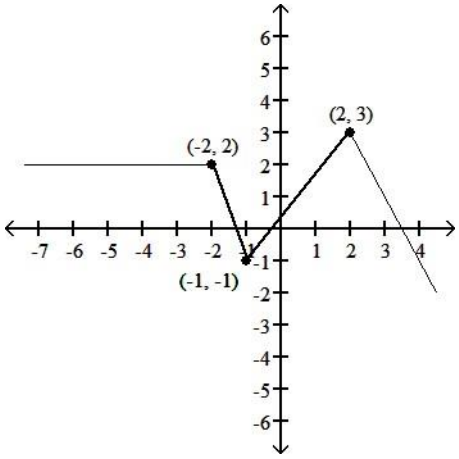
Using the graph below, sketch the graph of the given function.



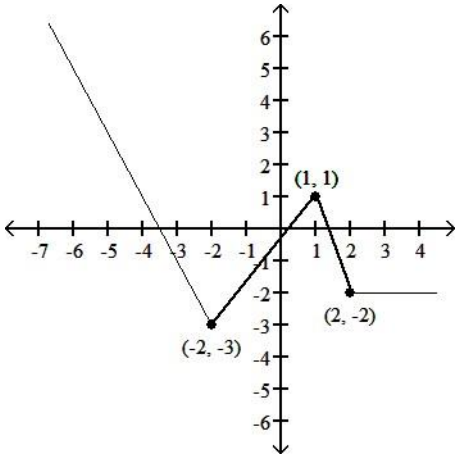
102) y = - f(x) 102) _____



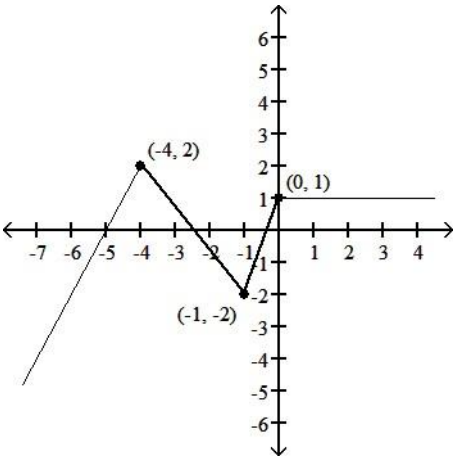
A)



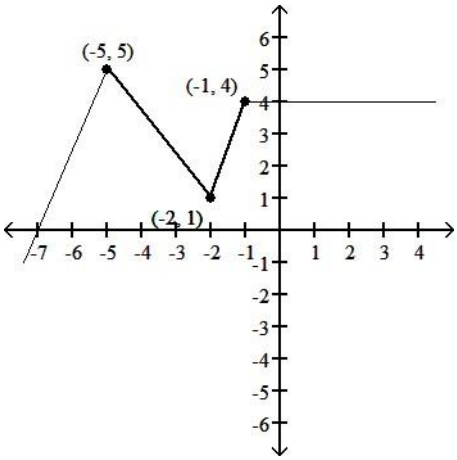
B)



C)

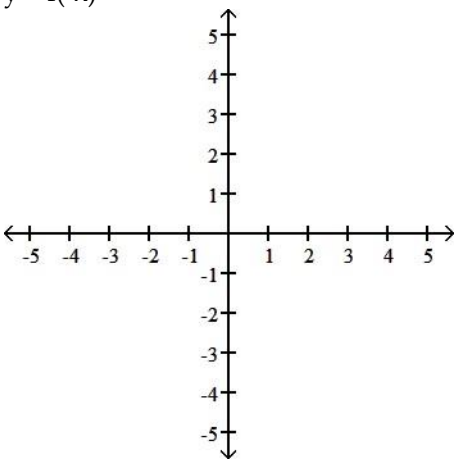


D)

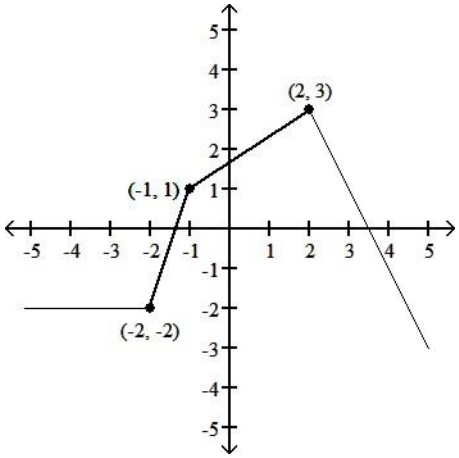


103) y = f(-x)

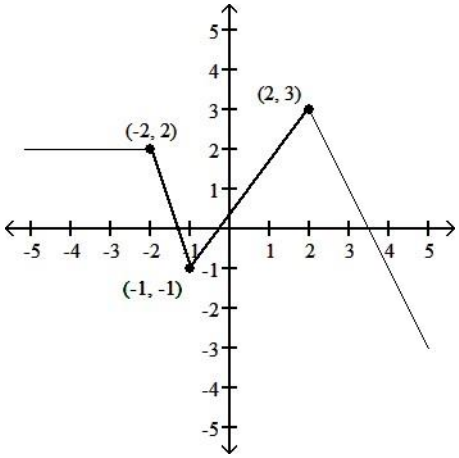
103) _____



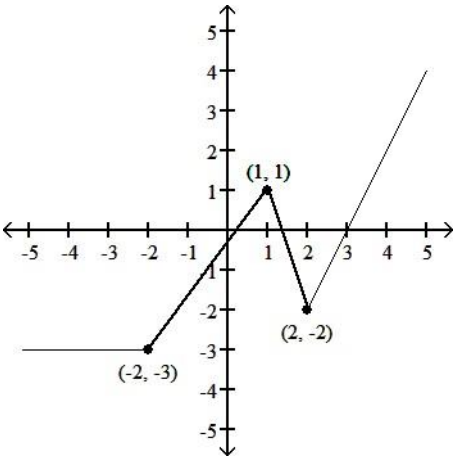
A)



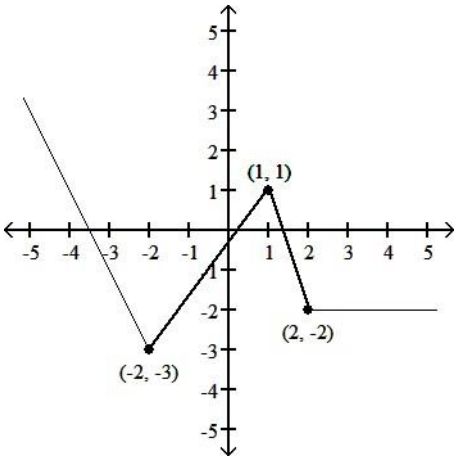
B)



C)

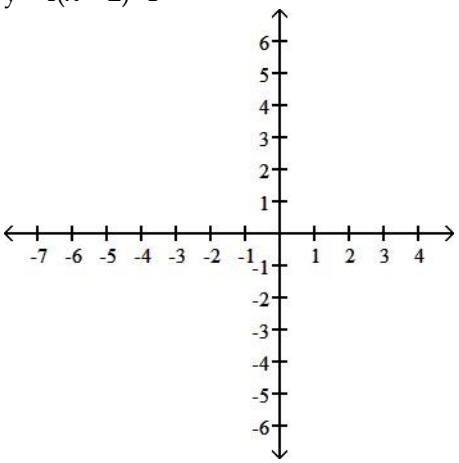


D)

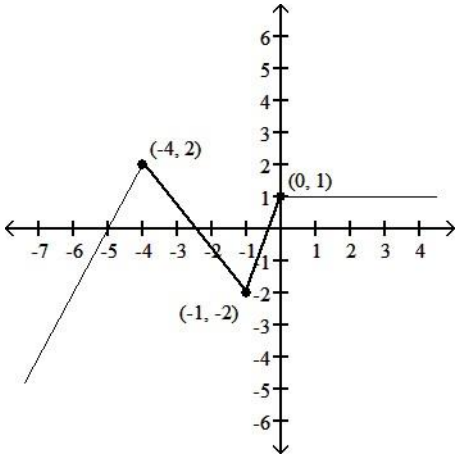


104) y = f(x + 2) -1

104) _____

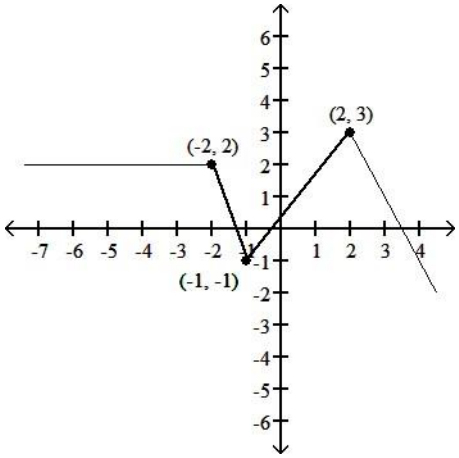


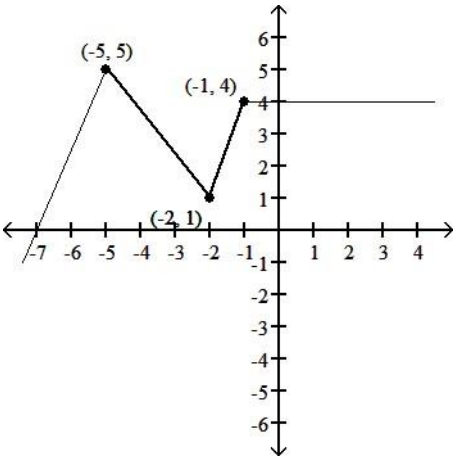
A)



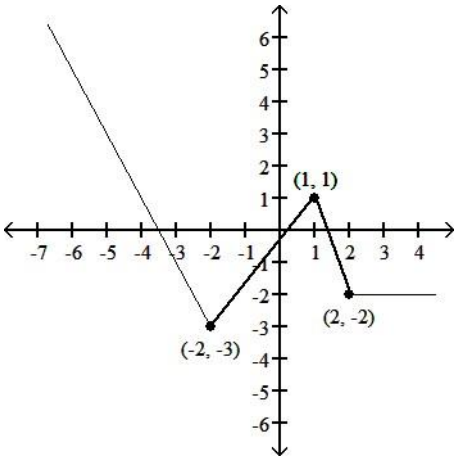
C)

B)



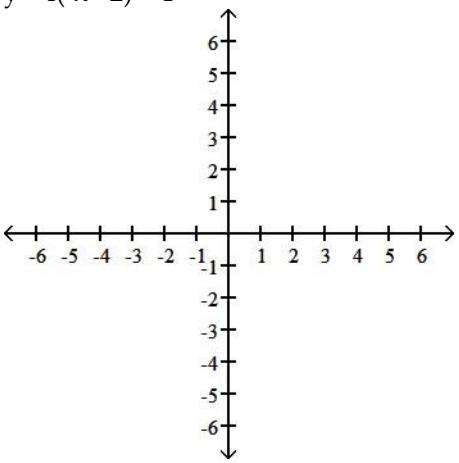


D)

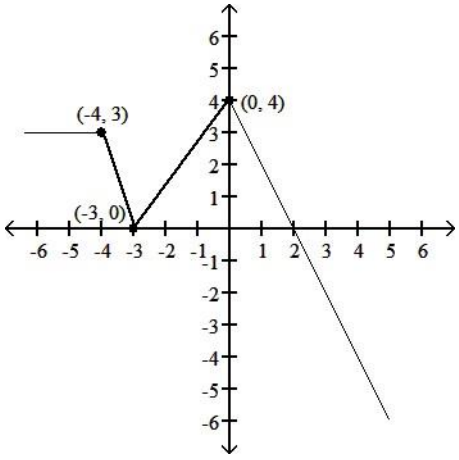


105) y = f(-x - 2) + 1

105) _____



A)



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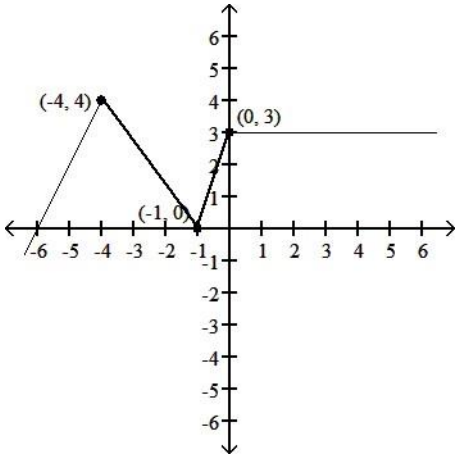

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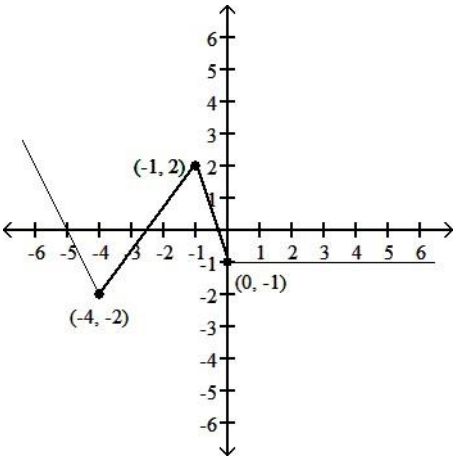
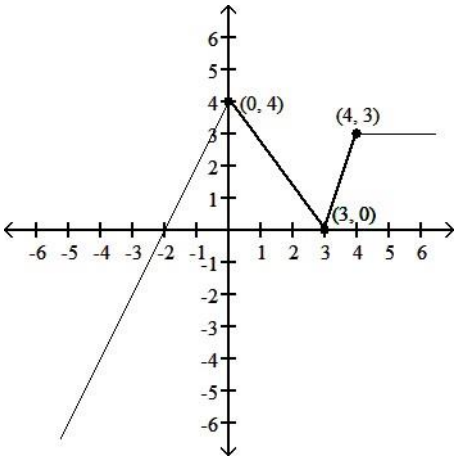
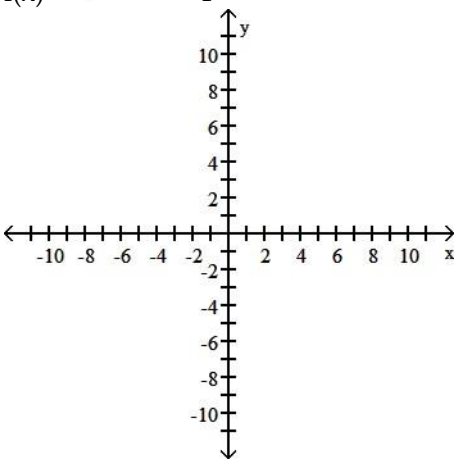


D)

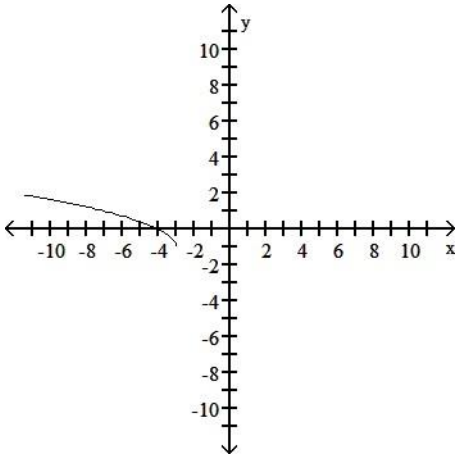


Graph the function.

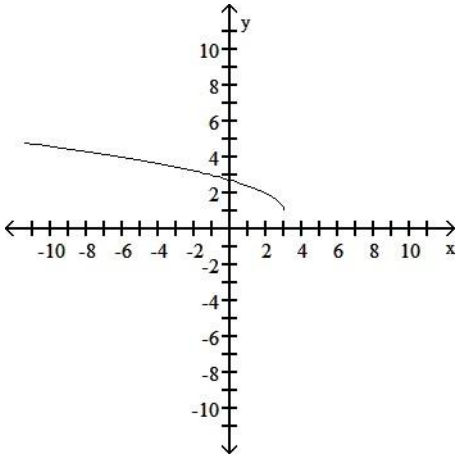
106) $f(x) = \sqrt{x + 3} + 1$ 106) _____



A)

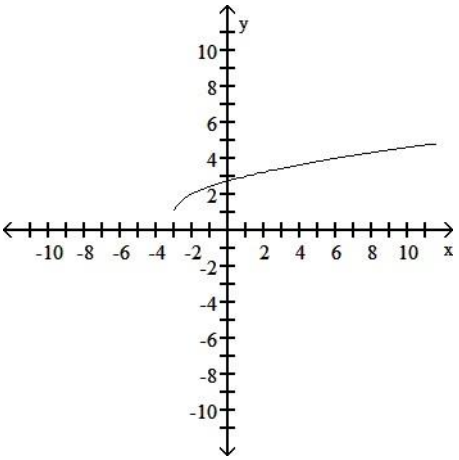


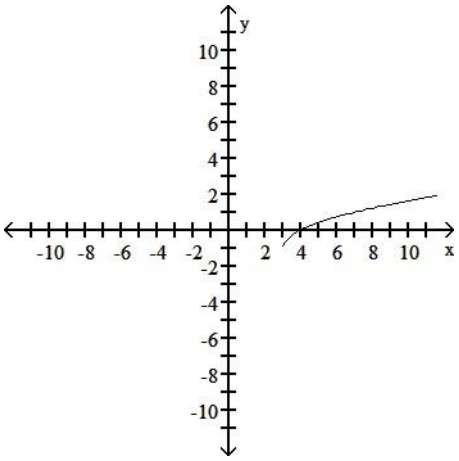
B)



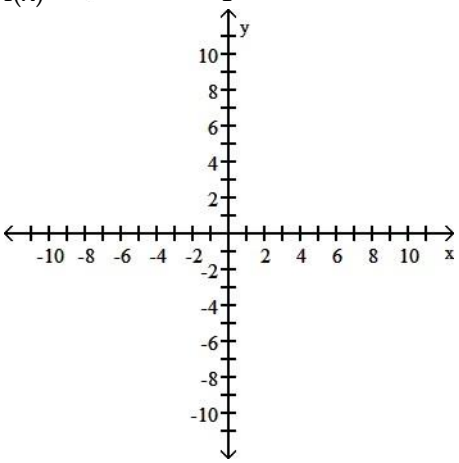
C)

D)



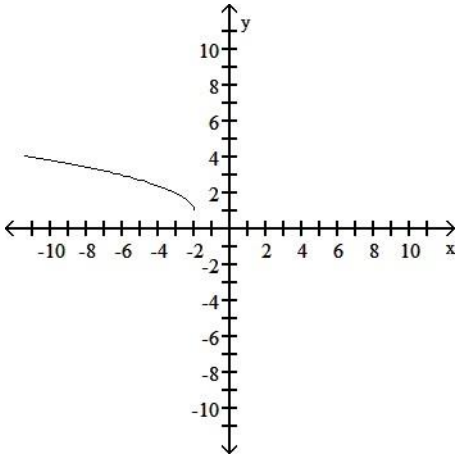


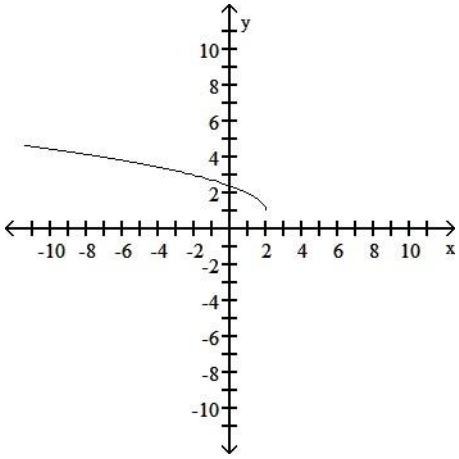
107) $f(x) = \sqrt{-2 - x} + 1$ 107) _____



A)

B)





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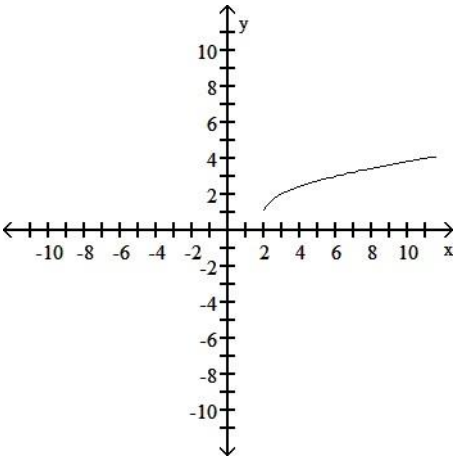
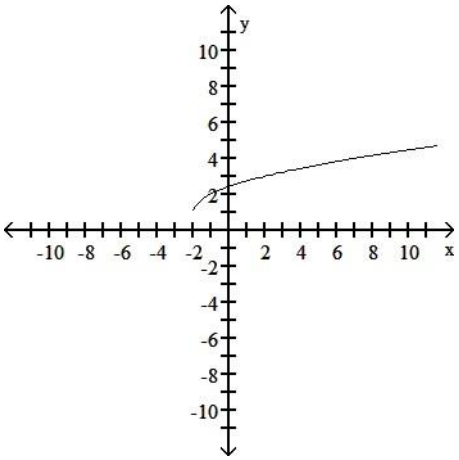
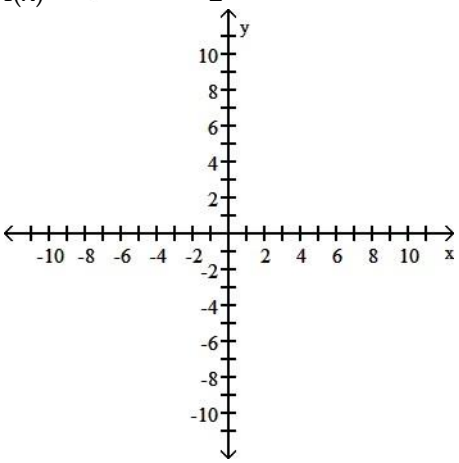


D)

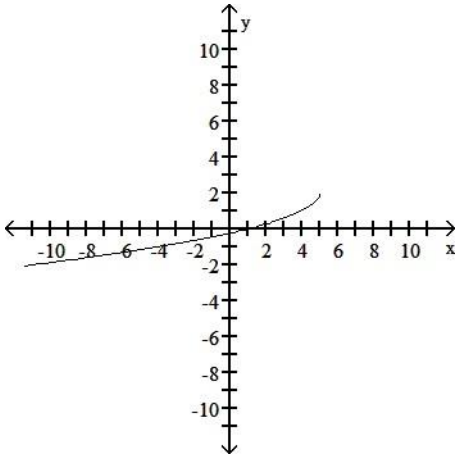


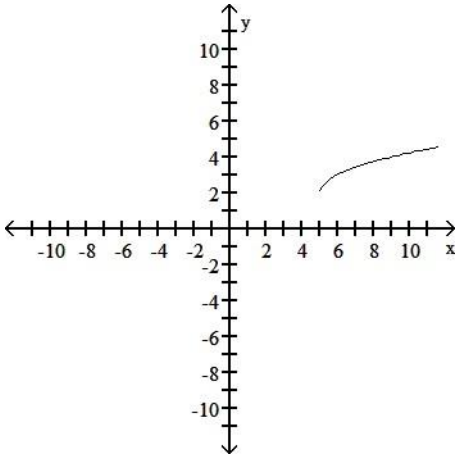
108) $f(x) = -\sqrt{5 - x} + 2$ 108) _____



A)

B)





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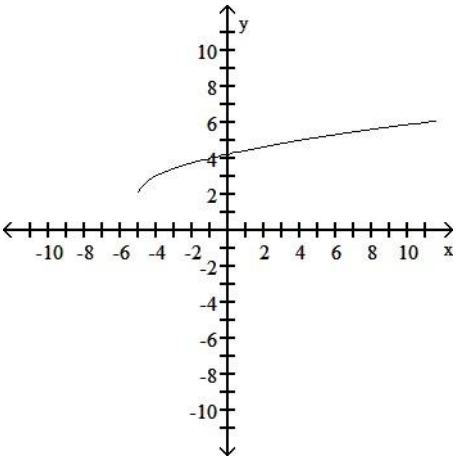

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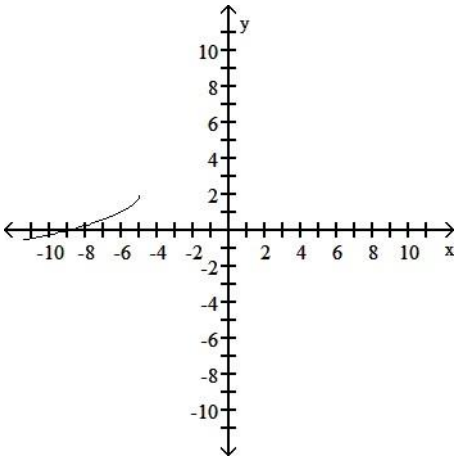
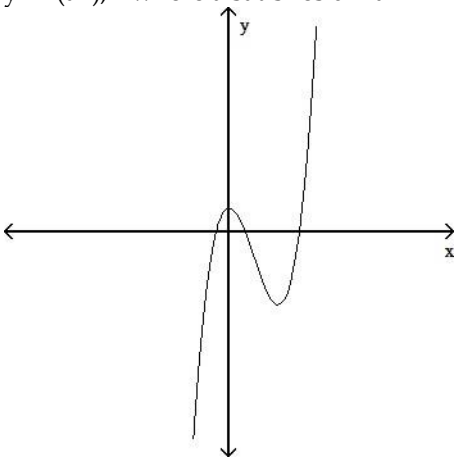
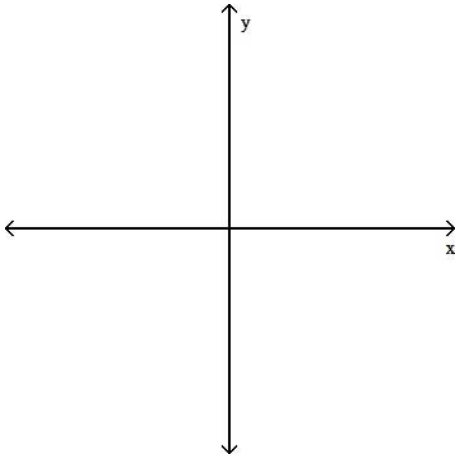


Graph the indicated new function, given the graph for y = f(x).

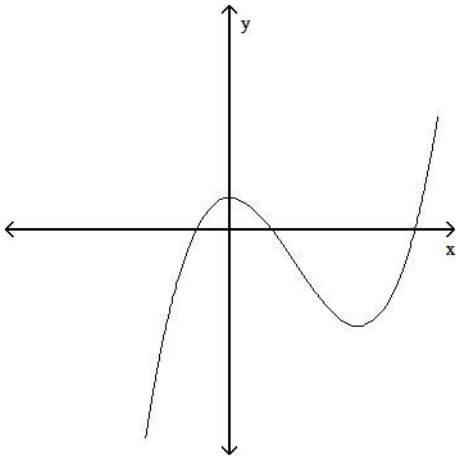
109) y = f(ax), where a satisfies 0 < a < 1 109) _____



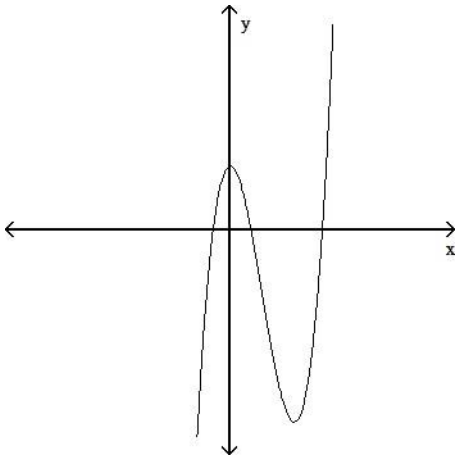
A)

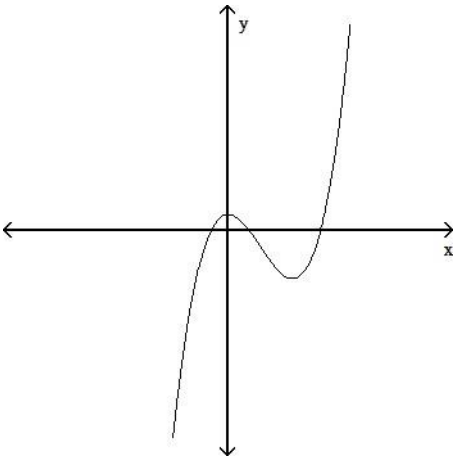


B)

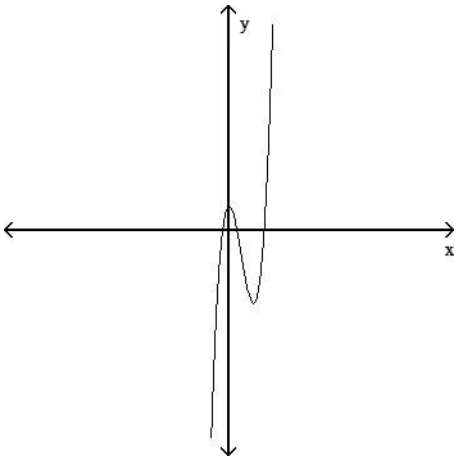


C)

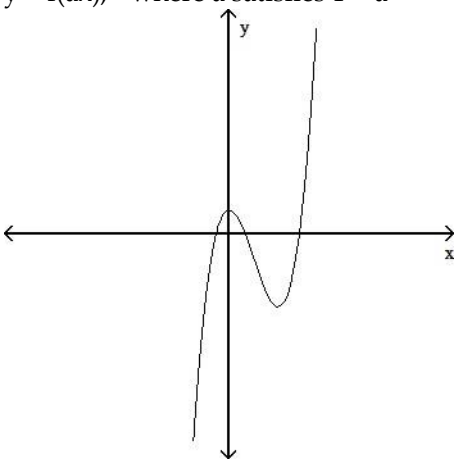




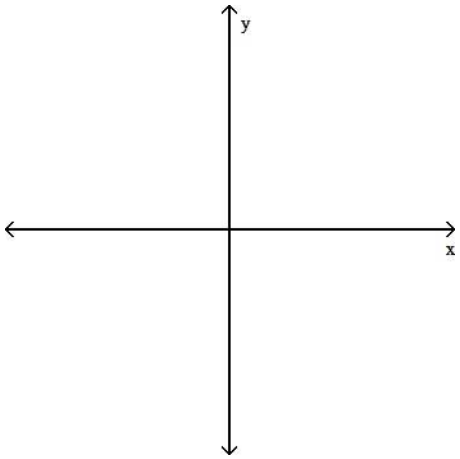
D)



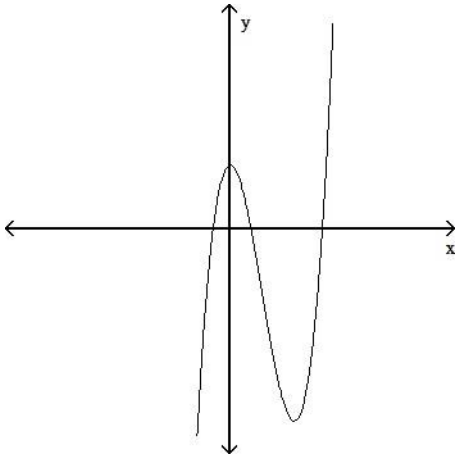
110) y = f(ax), where a satisfies 1 < a 110) _____



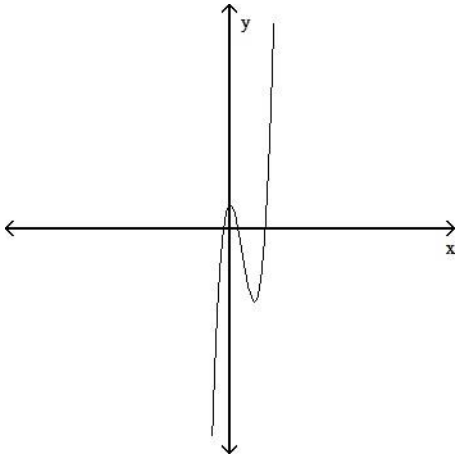
A)

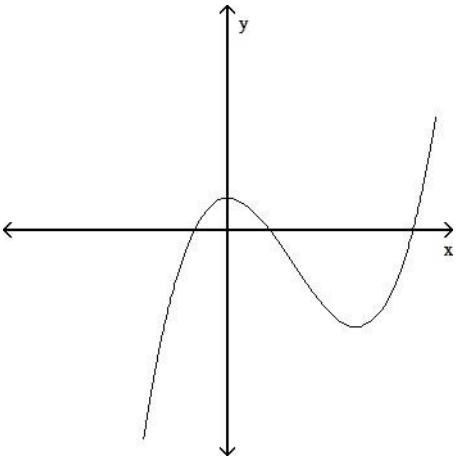


B)

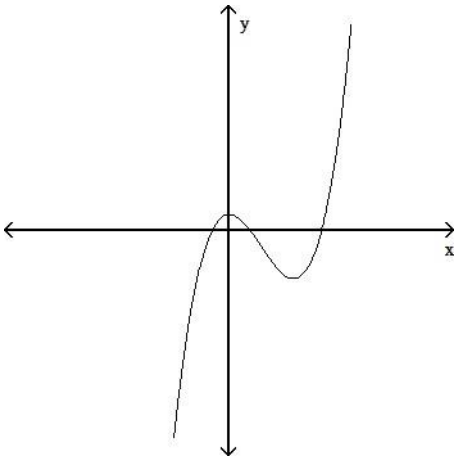


C)

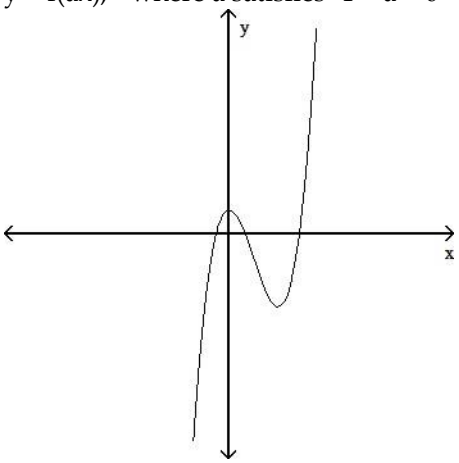




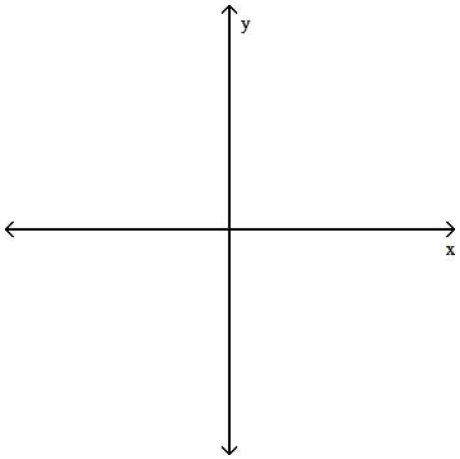
D)



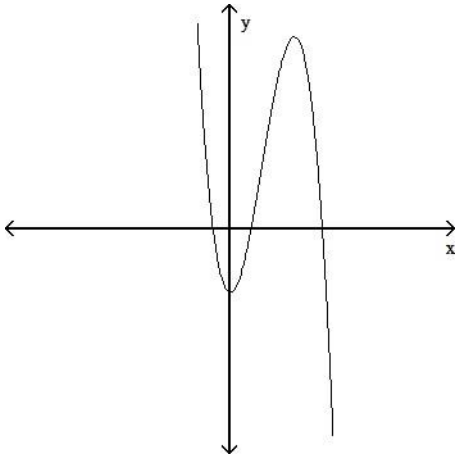
111) y = f(ax), where a satisfies -1 < a < 0 111) _____



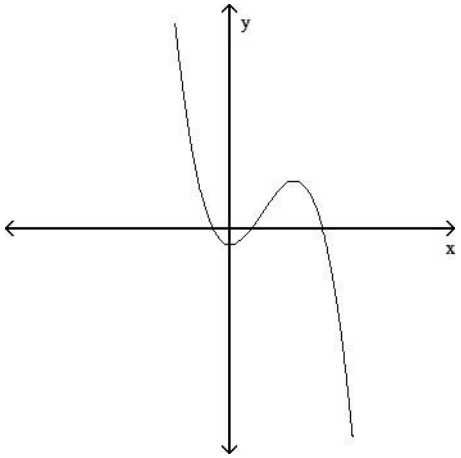
A)

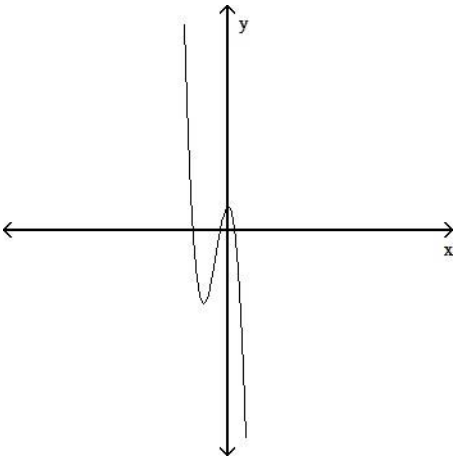


B)

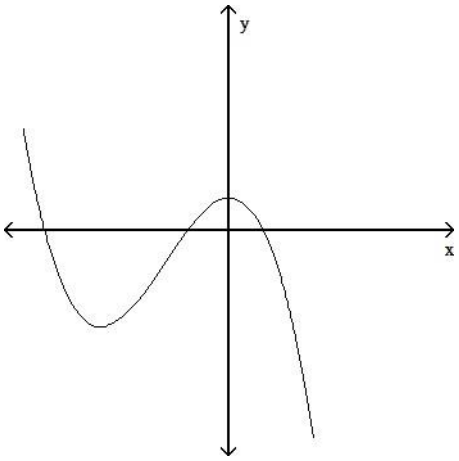


C)

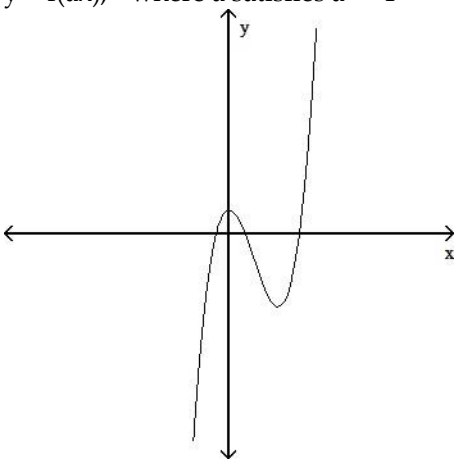




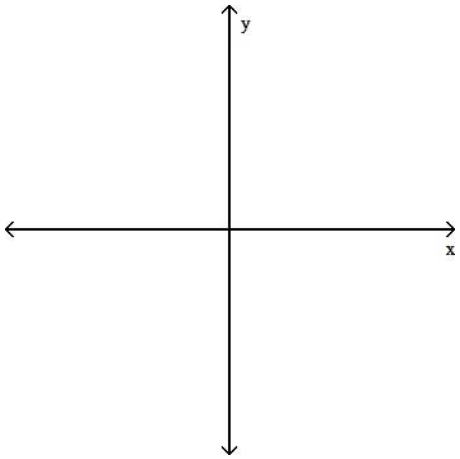
D)



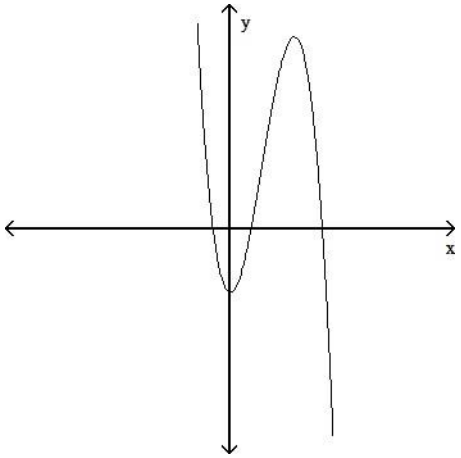
112) y = f(ax), where a satisfies a < -1 112) _____



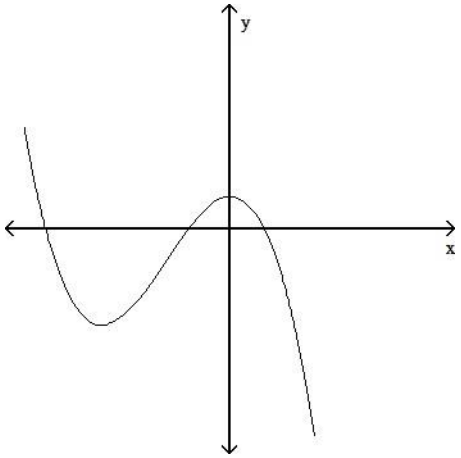
A)

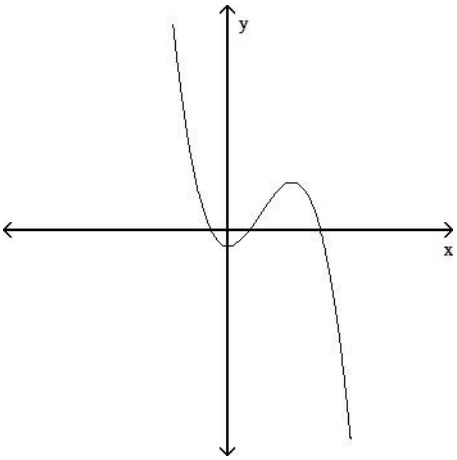


B)

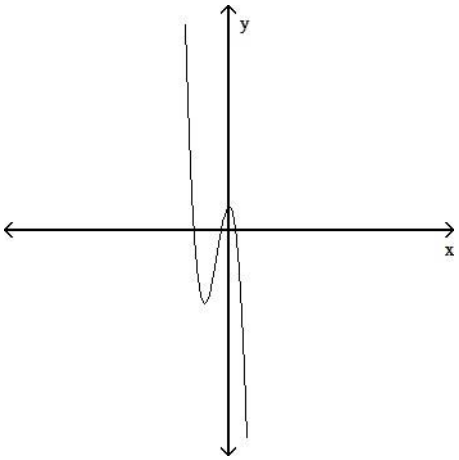


C)

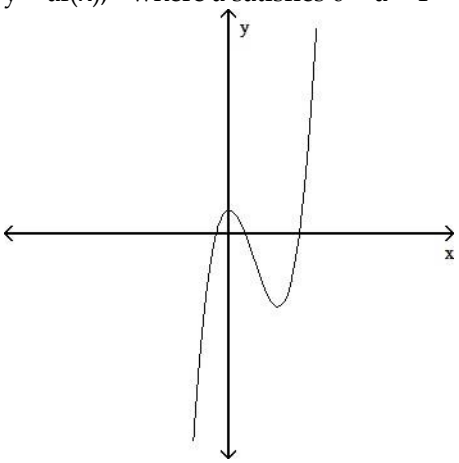




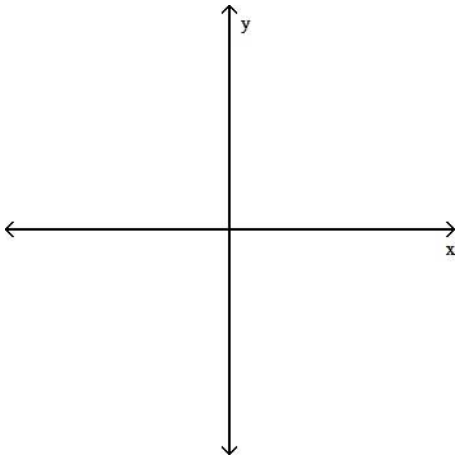
D)



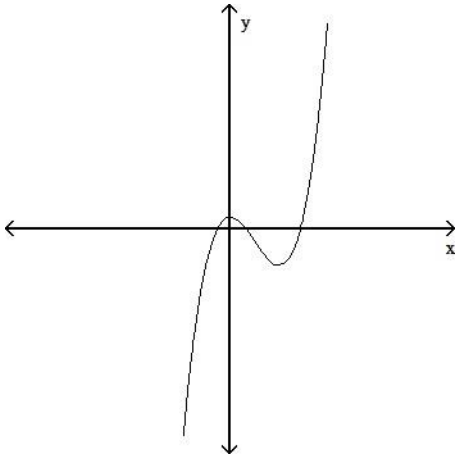
113) y = af(x), where a satisfies 0 < a < 1 113) _____



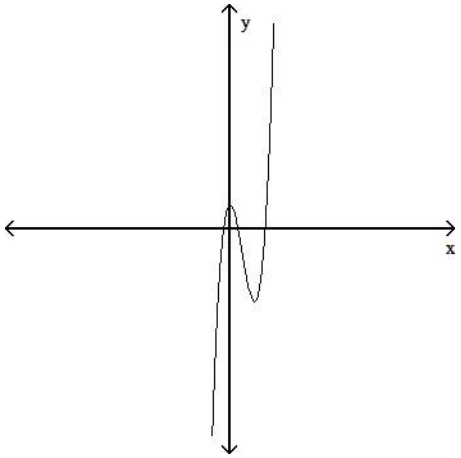
A)

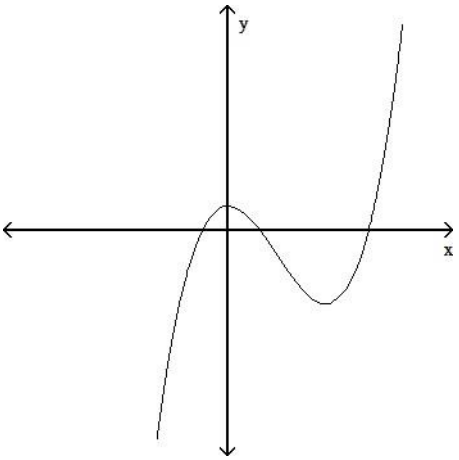


B)

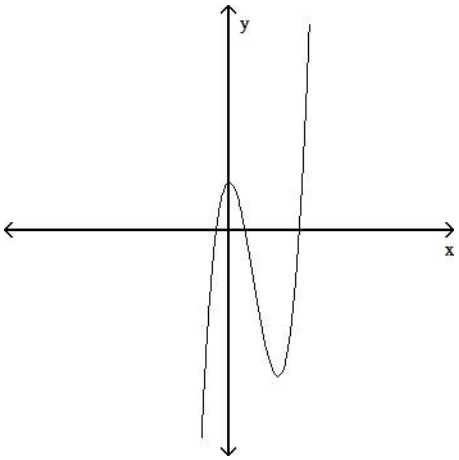


C)



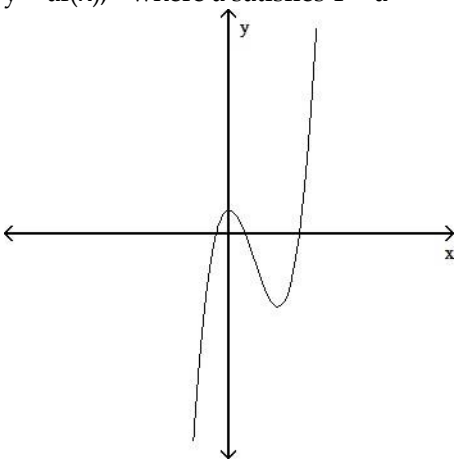


D)

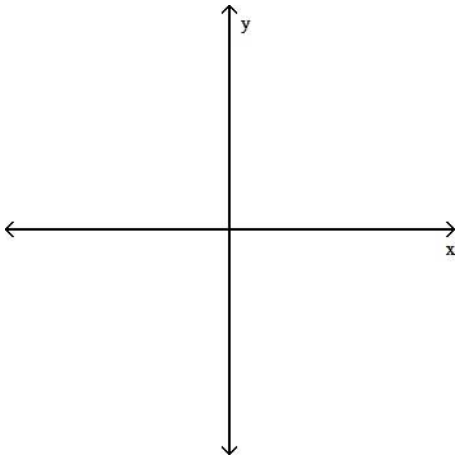


114) y = af(x), where a satisfies 1 < a

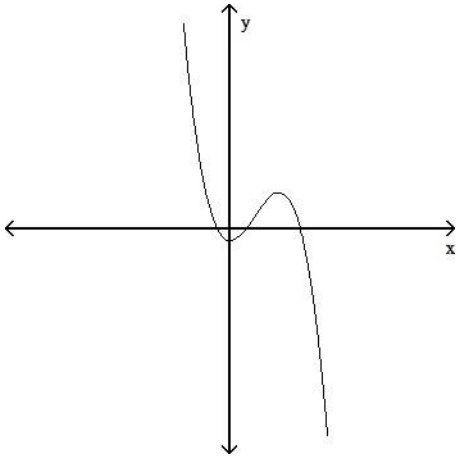
114) _____



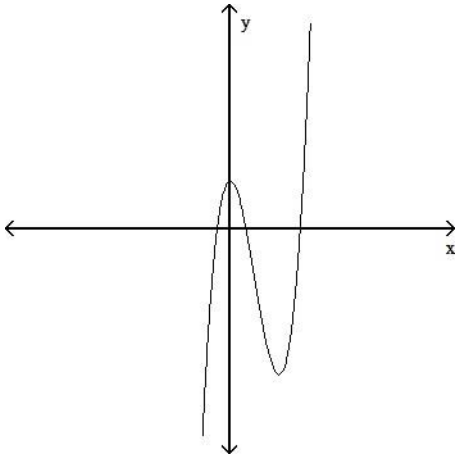
A)

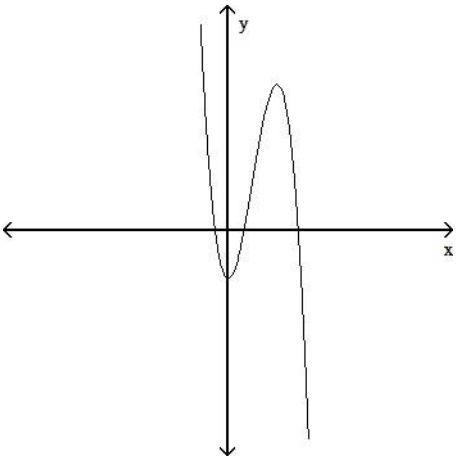


B)

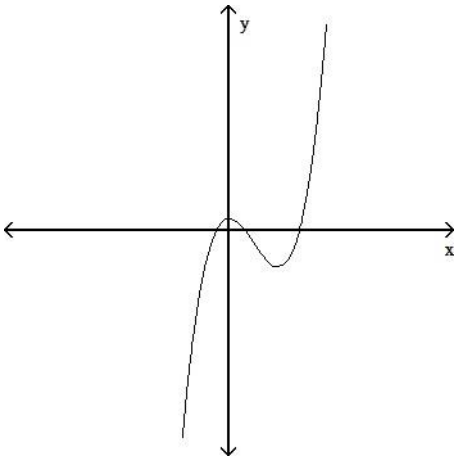


C)

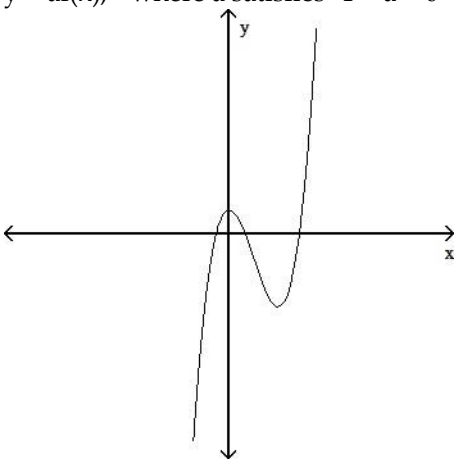




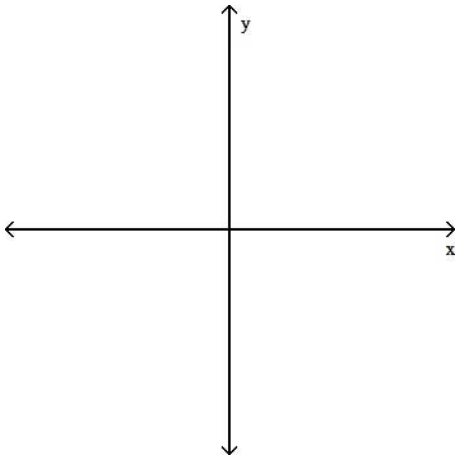
D)



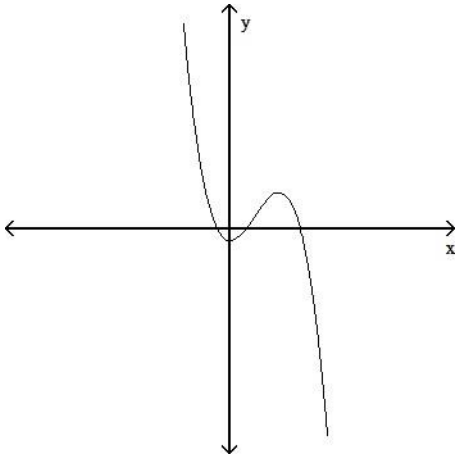
115) y = af(x), where a satisfies -1 < a < 0 115) _____



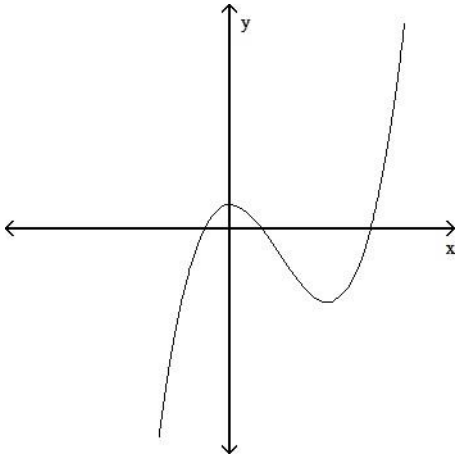
A)

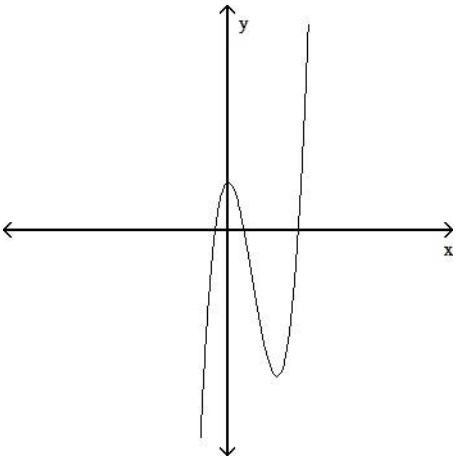


B)

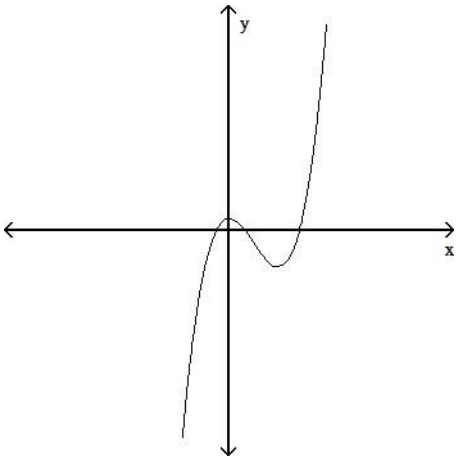


C)

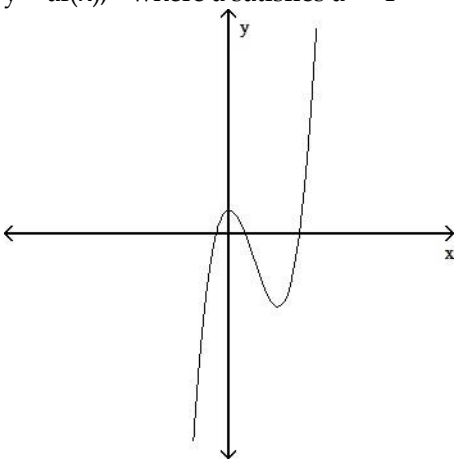




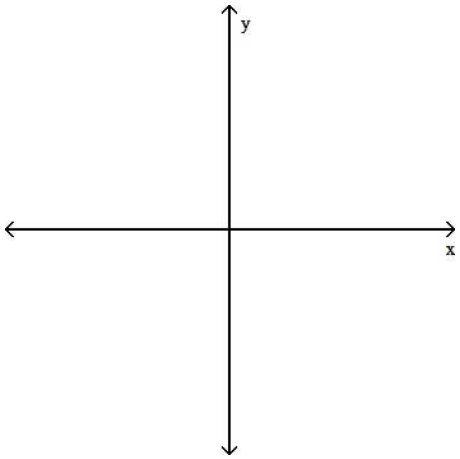
D)



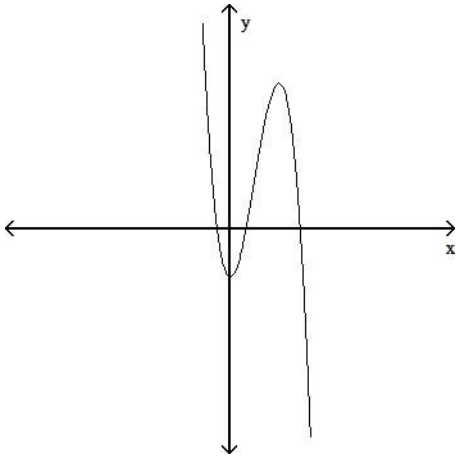
116) y = af(x), where a satisfies a < -1 116) _____



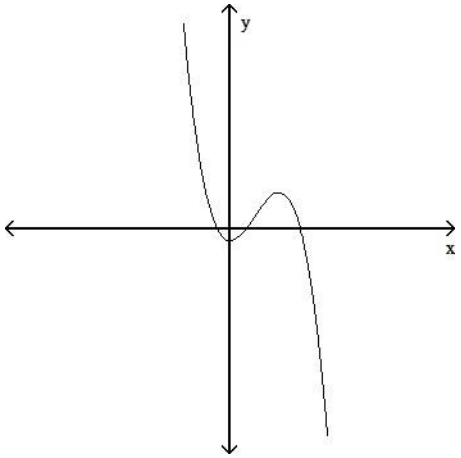
A)

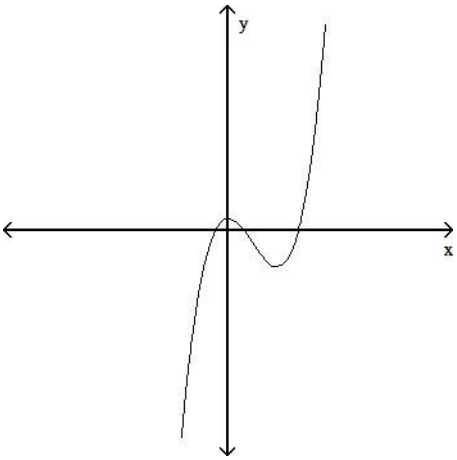


B)

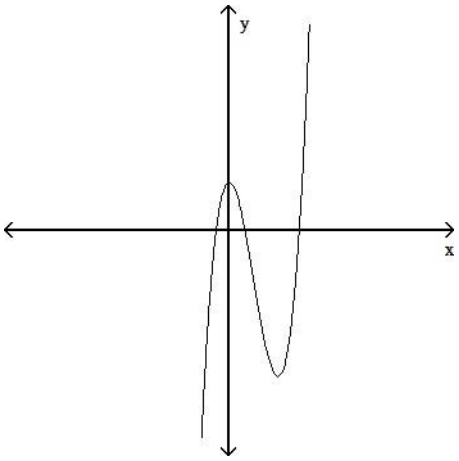


C)





D)



Solve the problem.

117) John owns a hotdog stand. He has found that his profit is represented by the equation $P(x) = -x^2 + 60x + 75$, where is x the number of hotdogs. How many hotdogs must he sell to earn the most profit? 117) _____

A) 75 hotdogs B) 30 hotdogs C) 60 hotdogs D) 45 hotdogs

118) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $C(x) = 4x^2 - 320x + 73$, where x is the number of watches repaired. How many watches should he repair to produce the lowest cost? 118) _____

A) 40 watches B) 292 watches C) 73 watches D) 160 watches

119) John owns a hotdog stand. He has found that his profit is represented by the equation $P(x) = -x^2 + 12x + 44$, where x is the number of hotdogs. What is the most he can earn? 119) _____

A) \$ 12 B) \$ 44 C) \$ 22 D) \$ 80

120) Bob owns a watch repair shop. He has found that the cost of operating his shop is given by $C(x) = 4x^2 - 32x + 235$, where x is the number of watches repaired. What is his minimum cost? 120) _____

A) \$ 374 B) \$ 171 C) \$ 342 D) \$ 187

121) Suppose the cost of producing x items is given by $C(x) = 3200 - x^3$ and the revenue made on the sale of x items is $R(x) = 400x - 8x^2$. Find the number of items which serves as a break-even point. 121) _____

A) 16 items B) 80 items C) 4 items D) 8 items

122) Let $C(x) = 10x + 89$ be the cost to produce x units of a product, and let $R(x) = -x^2 + 30x$ be the revenue. Find the maximum profit. 122) _____

A) \$ 10 B) \$ 14 C) \$ 11 D) \$ 9

123) An advertising agency has discovered that when the Holt Company spends x thousands of dollars on advertising, it results in a profit increase in thousands of dollars given by the function $P(x) = -\frac{1}{4}(x - 10)^2 + 60$. How much should the Holt Company spend on advertising to maximize the profit? 123) _____

A) \$ 63,000 B) \$ 60,000 C) \$10,000 D) \$8000

124) A projectile is thrown upward so that its distance above the ground, in feet, after t seconds is $h = -11t^2 + 330t$. After how many seconds does it reach its maximum height? 124) _____

A) 30 sec B) 11 sec C) 15 sec D) 22 sec

125) If an object is thrown upward with an initial velocity of 10 feet per second, then its height is given by $h = -10t^2 + 60t$. After how many seconds does it hit the ground? 125) _____

A) 3 sec B) 6 sec C) 20 sec D) 10 sec

126) The length and width of a rectangle have a sum of 176. What dimensions will give the maximum area? 126) _____

A) 44 by 132 B) 44 by 44 C) 88 by 88 D) 87 by 89

127) A projectile is thrown upward so that its distance above the ground, in feet, after t seconds is $h = -11t^2 + 308t$. What is its maximum height? 127) _____

A) 3234 ft B) 1078 ft C) 2156 ft D) 1617 ft

128) If an object is thrown upward with an initial velocity of 13 feet per second, then its height is given by $h = -13t^2 + 104t$. What is its maximum height? 128) _____

A) 208 ft B) 312 ft C) 156 ft D) 104 ft

129) The number of mosquitoes M(x), in millions, in a certain area depends on the June rainfall x, in inches: $M(x) = 18x - x^2$. What rainfall produces the maximum number of mosquitoes? 129) _____

A) 18 in. B) 0 in. C) 9 in. D) 324 in.

130) A Community College wants to construct a rectangular parking lot on land bordered on one side by a highway. It has 1200 feet of fencing to use along the other three sides. What should be the dimensions of the lot if the enclosed area is to be a maximum? (Hint: Let x represent the width of the lot, and let $1200 - 2x$ represent the length.) 130) _____

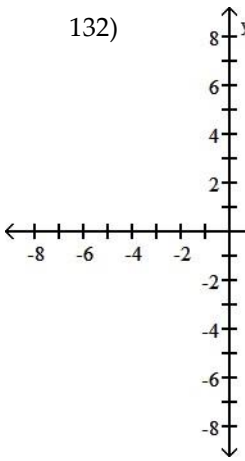
A) 400 ft by 800 ft B) 400 ft by 400 ft C) 300 ft by 900 ft D) 300 ft by 600 ft

131) What is the maximum area that can be enclosed by 720 feet of fencing? 131) _____

A) 28,800 sq ft B) 32,400 sq ft C) 64,800 sq ft D) 57,600 sq ft

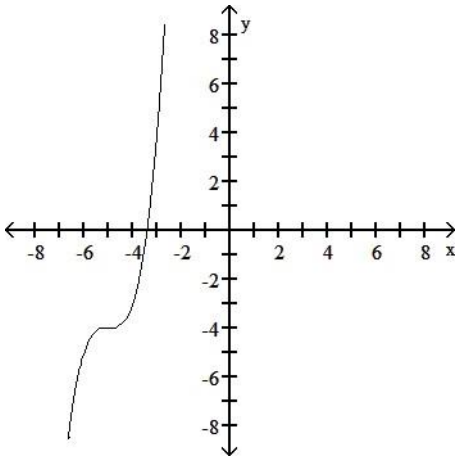
Use the principles of translating and reflecting to graph the function.

132) $f(x) = (x + 5)^3 + 4$ 132)

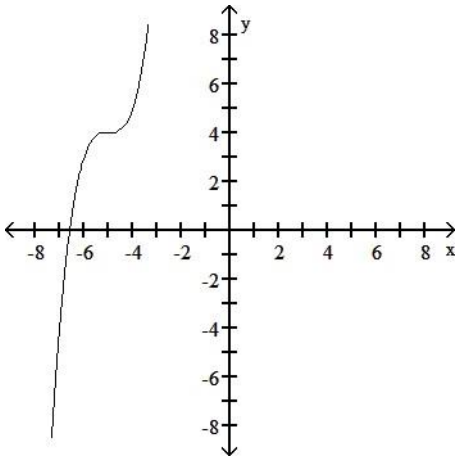


____

A)



B)



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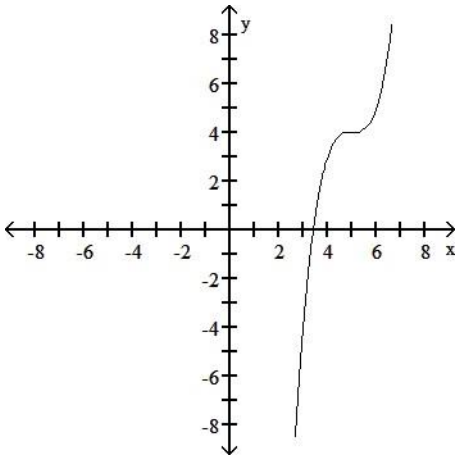
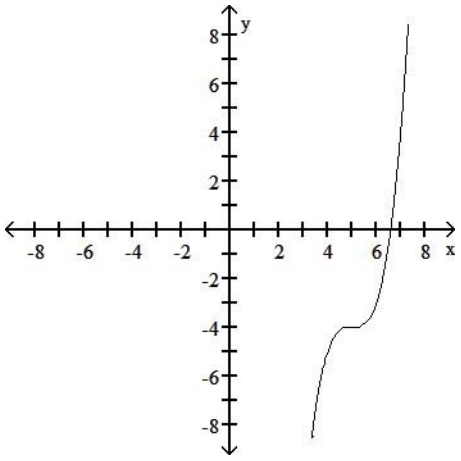
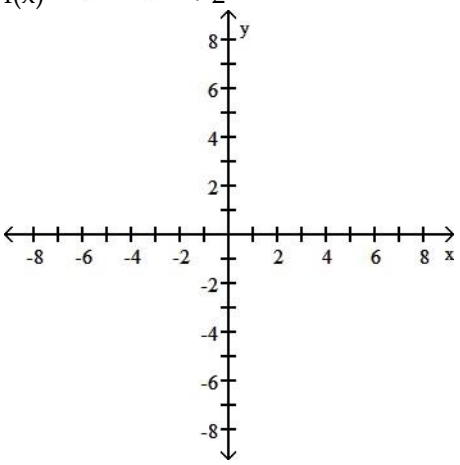


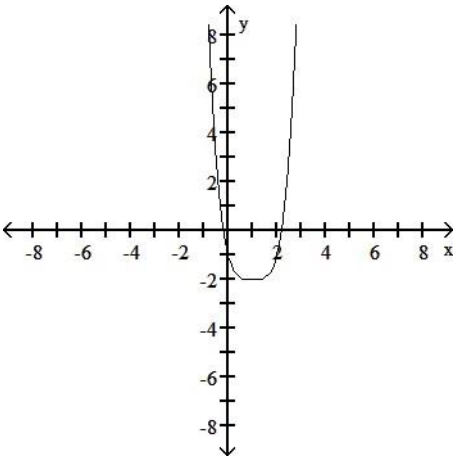
D)



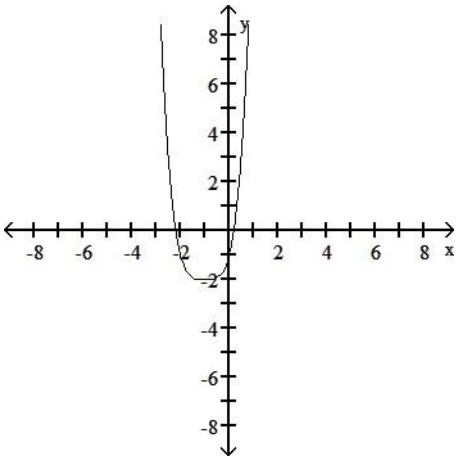
133) $f(x) = -(x + 1)^4 + 2$ 133) ____



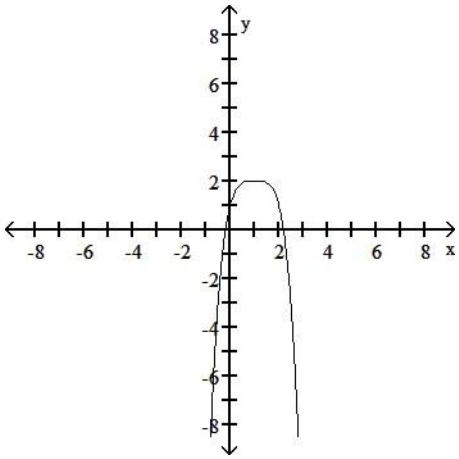
A)



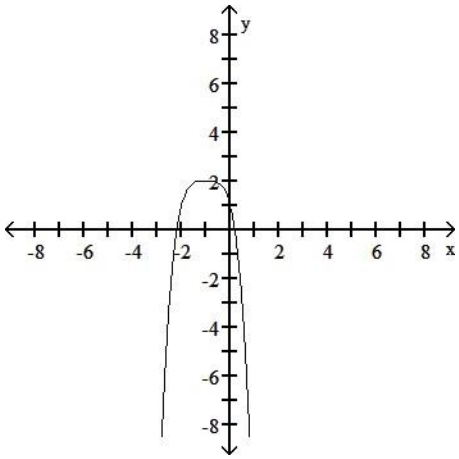
B)



C)



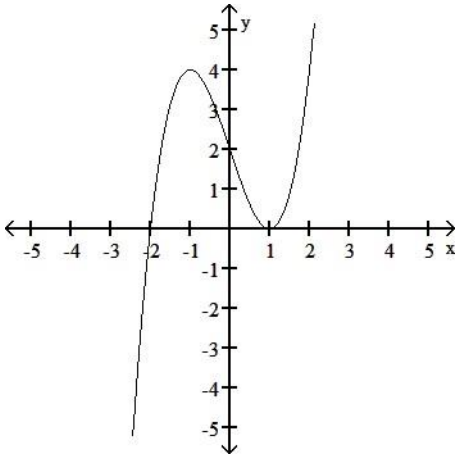
D)



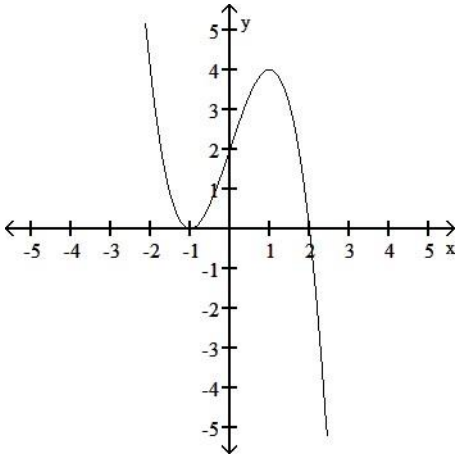
Match the function to the correct graph.

134) $y = x^3 - 3x + 2$ 134) _____

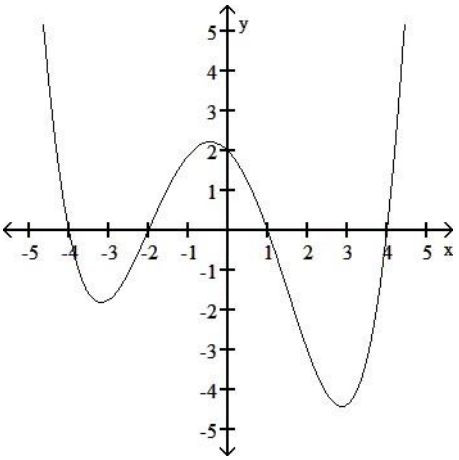
A)



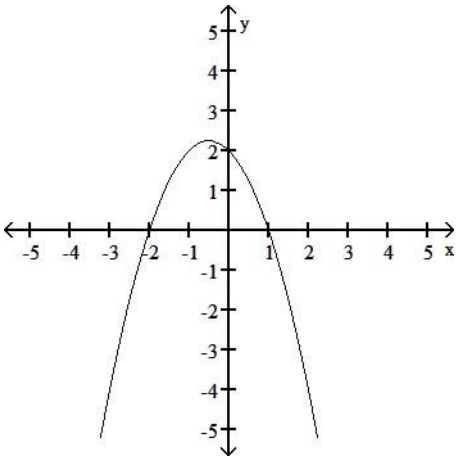
B)



C)

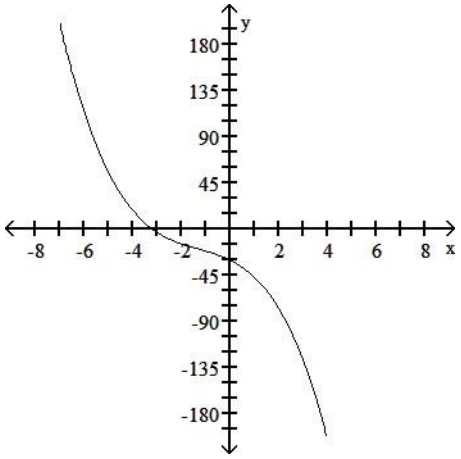


D)

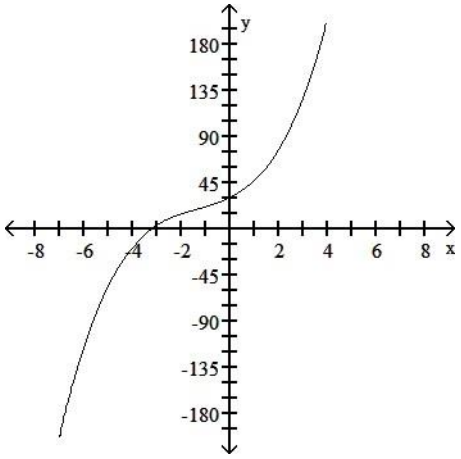


135) $y = -x^3 - 4x^2 - 12x + 30$ 135) _____

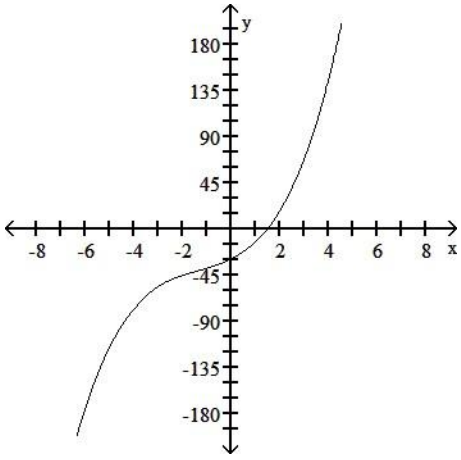
A)



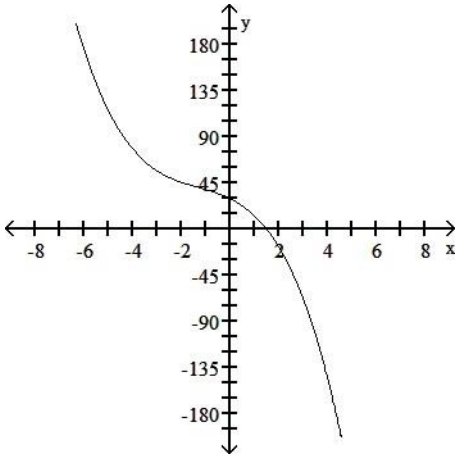
B)



C)

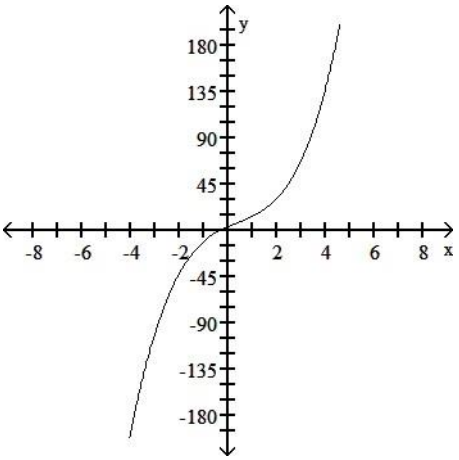


D)

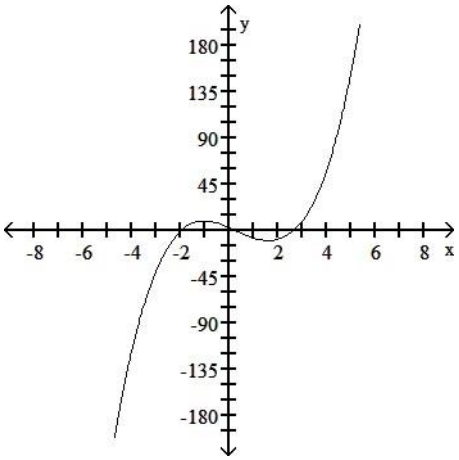


136) $y = 2x^3 - 2x^2 + 10x + 3$ 136) _____

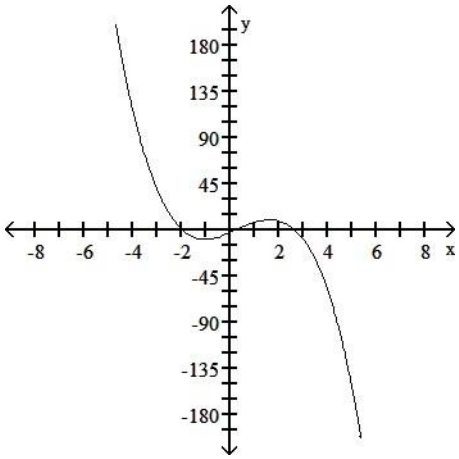
A)



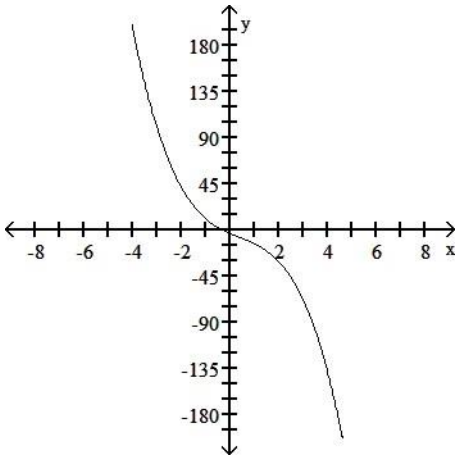
B)



C)

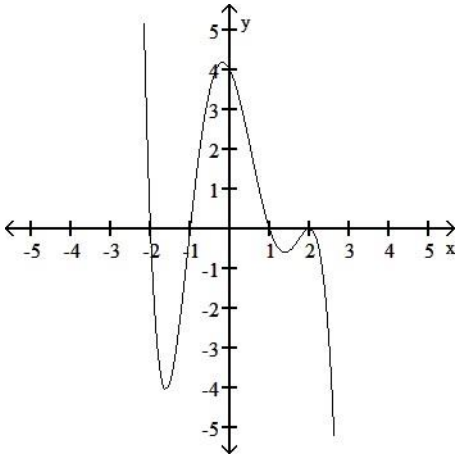


D)

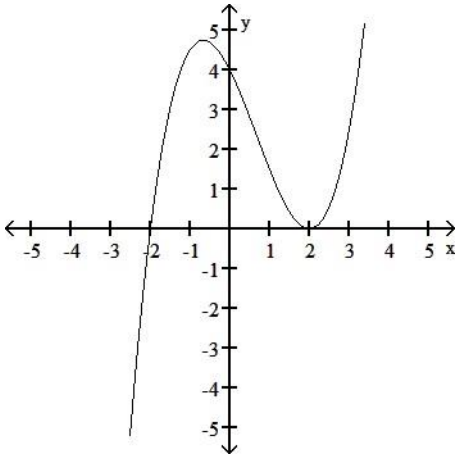


137) $y = x^4 + x^3 - 5x^2 - 4x + 4$ 137) ____

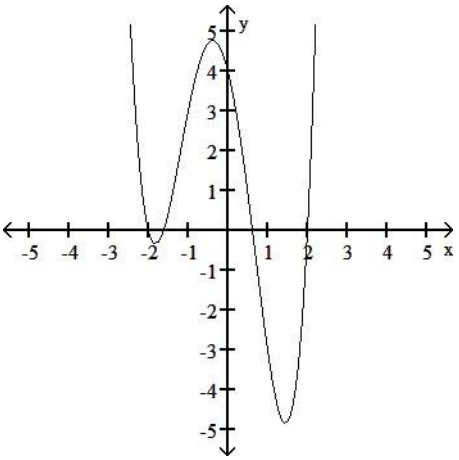
A)



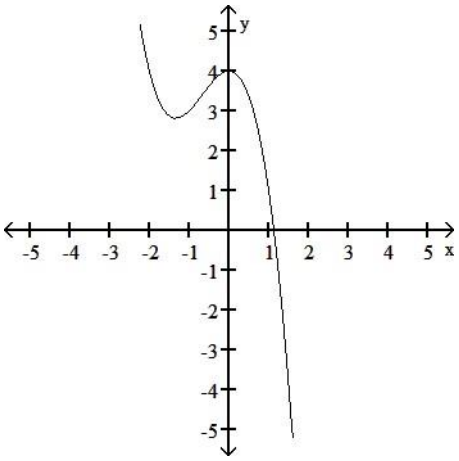
B)



C)

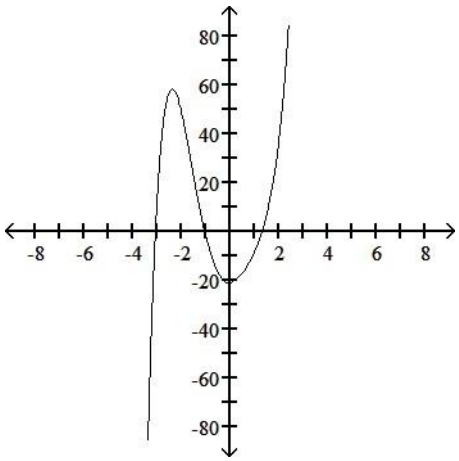


D)

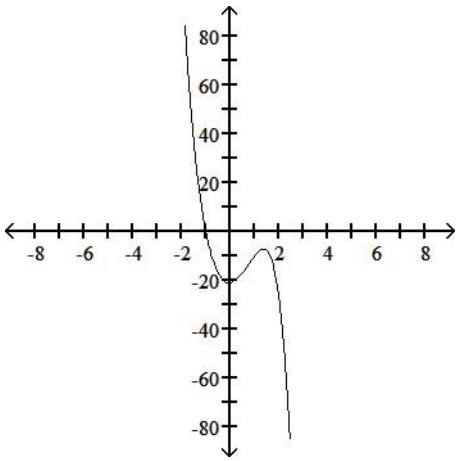


138) $y = x^4 - 5x^3 + 16x^2 + x - 21$ 138) _____

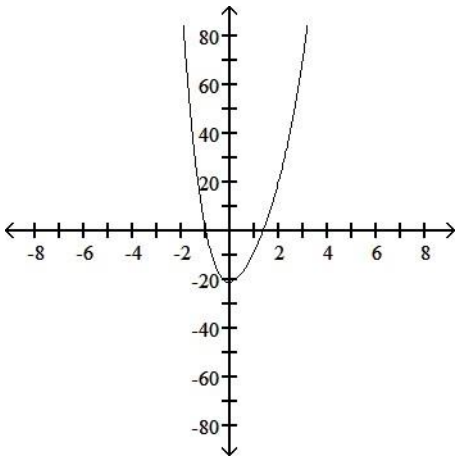
A)



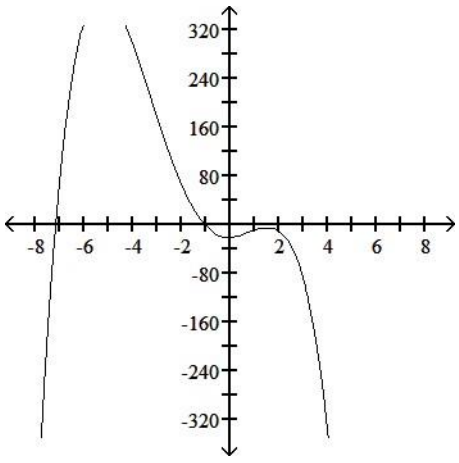
B)



C)

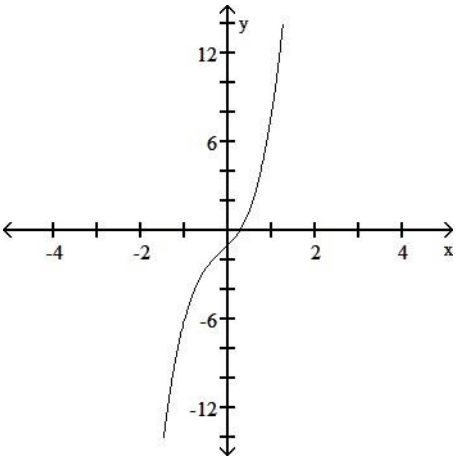


D)

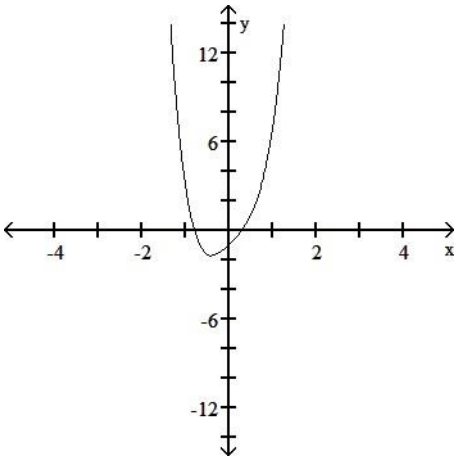


139) $y = 4x^4 - x^3 + 2x^2 + 3x - 1$ 139) _____

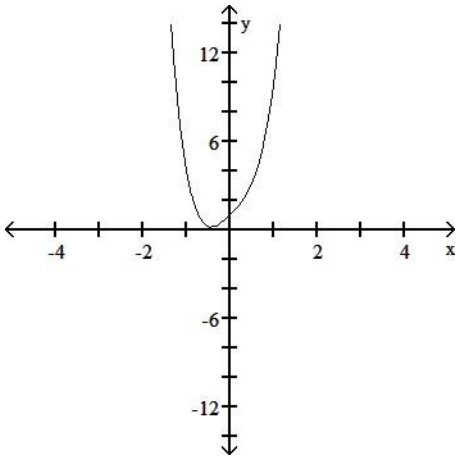
A)



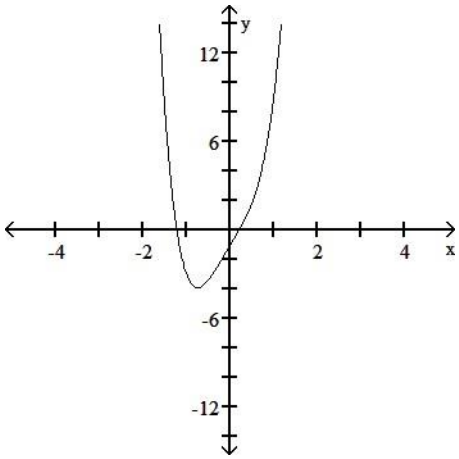
B)



C)

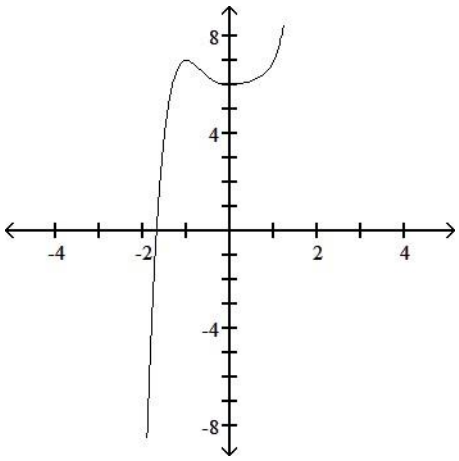


D)

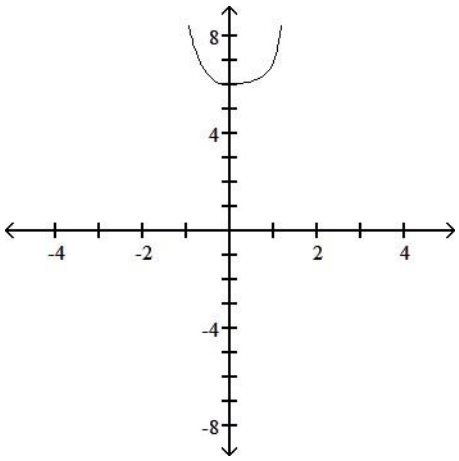


140) $y = x^5 - x^3 + x^2 + 6$ 140) _____

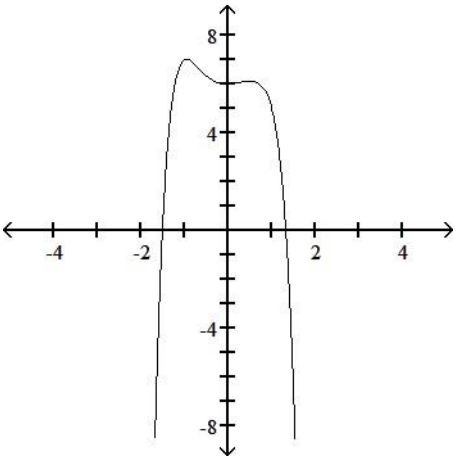
A)



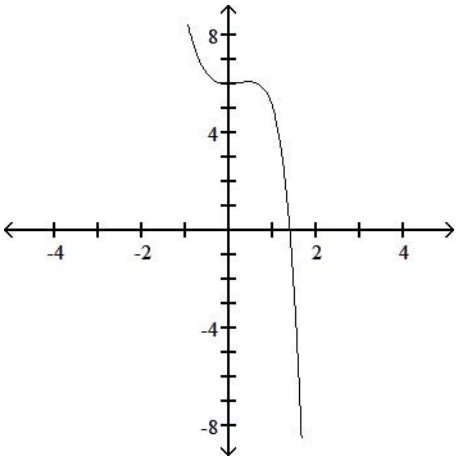
B)



C)

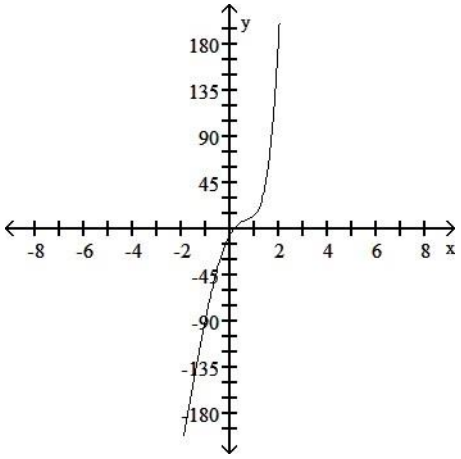


D)

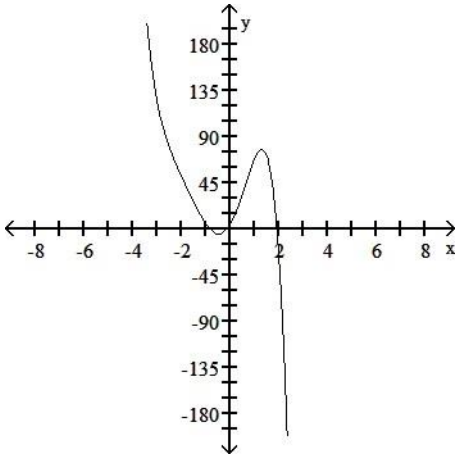


141) $y = 2x^5 + 10x^4 + 7x^3 - 42x^2 - 41x - 5$ 141) _____

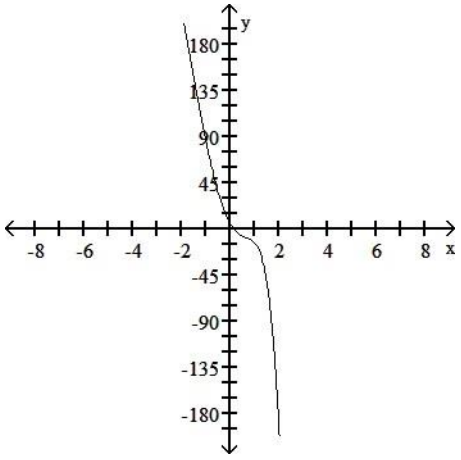
A)



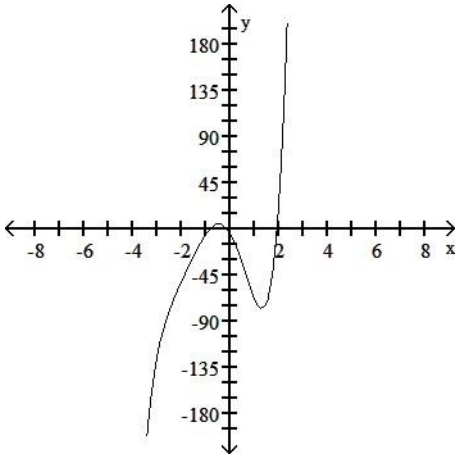
B)



C)

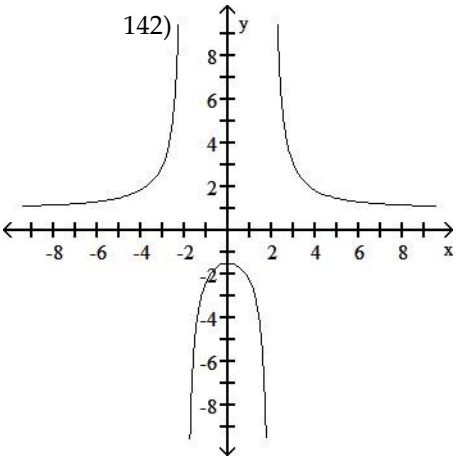


D)

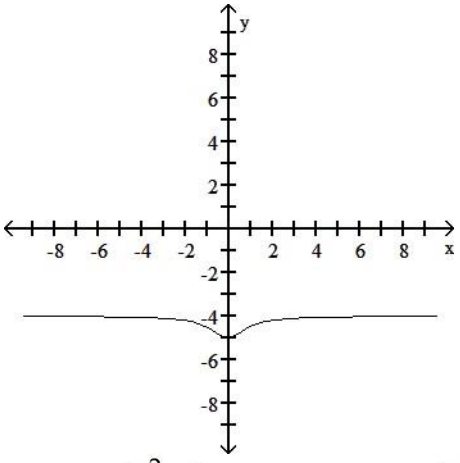


Match the graph to the correct function.

142)

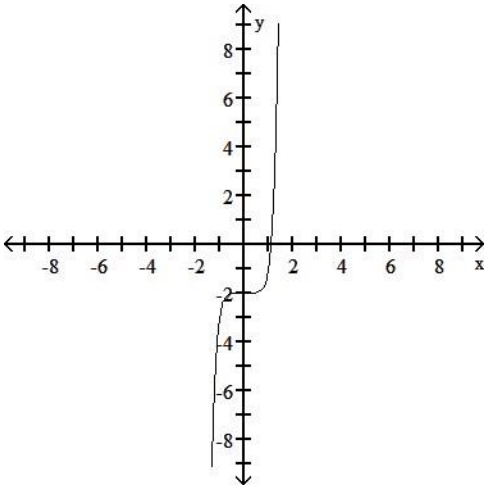
142)  ____
_

A) $y = \frac{x^2 - 6}{x^2 + 4}$ B) $y = \frac{x^2 + 6}{x^3 - 4}$ C) $y = \frac{x^2 + 6}{x^2 - 4}$ D) $y = \frac{x}{x^2 - 4}$

143)  143) _____

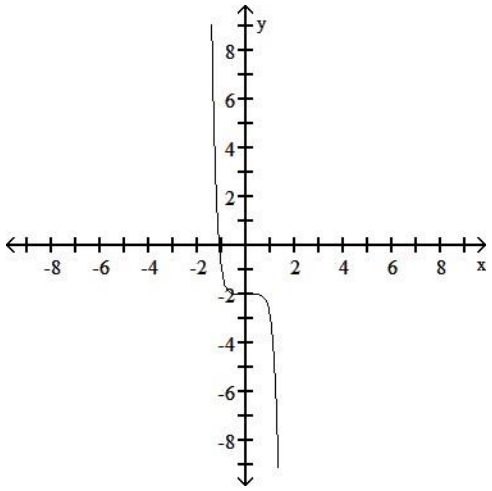
A) $y = \frac{4x^2 - 5}{x^2 + 1}$ B) $y = \frac{-4x^2 + 5}{x^2 - 1}$ C) $y = \frac{4x^2 + 5}{x^2 - 1}$ D) $y = \frac{-4x^2 - 5}{x^2 + 1}$

Give the possible values for the degree of the polynomial, and give the sign (+ or -) for the x^n term.

144)  144) _____

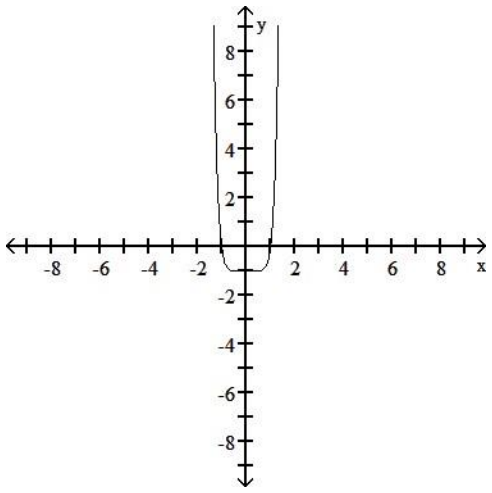
A) Degree is odd; +
B) Degree is even; -
C) Degree is even; +
D) Can't identify degree; +

145) 145) _____



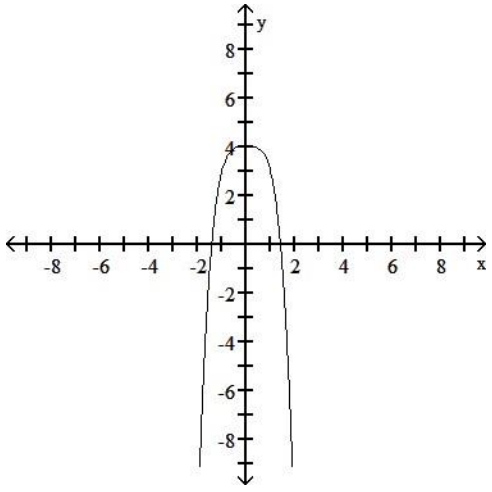
A) Can't identify degree; +
B) Degree is even; +
C) Degree is even; -
D) Degree is odd; -

146) 146) _____



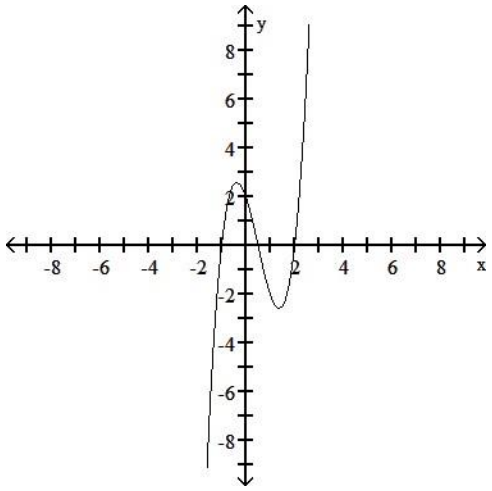
A) Degree is odd; +
B) Can't identify degree; +
C) Degree is even; -
D) Degree is even; +

147) 147) _____



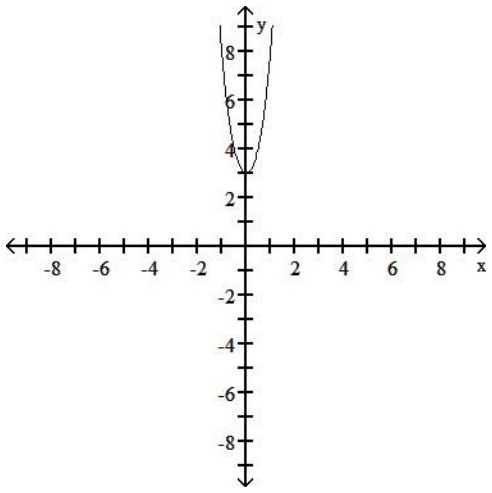
A) Degree is odd; -
B) Degree is even; -
C) Can't identify degree; -
D) Degree is even; +

148) 148) _____



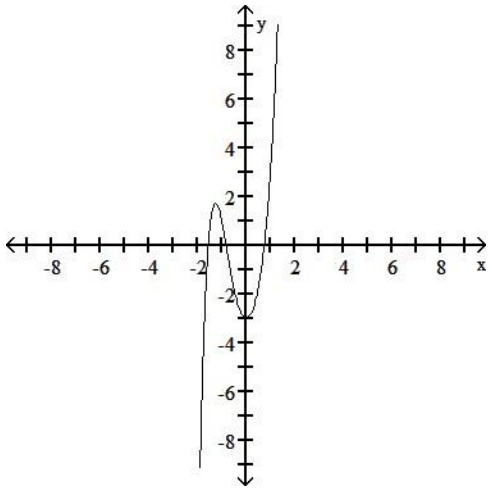
A) Degree is even; -
B) Degree is odd; +
C) Can't identify degree; +
D) Degree is even; +

149) 149) _____

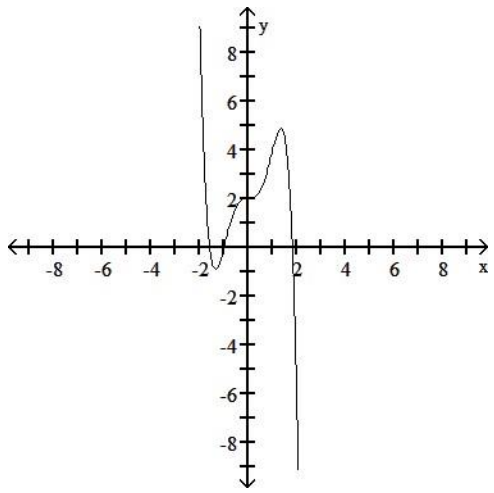


A) Can't identify degree; +
B) Degree is odd; +
C) Degree is even; +
D) Degree is even; -

150) 150) _____



A) Degree is odd; +
B) Can't identify degree; +
C) Degree is even; -
D) Degree is even; +

151)  151) _____

A) Degree is even; -
B) Degree is even; +
C) Degree is odd; -
D) Can't identify degree; -

Find the asymptotes of the function.

152) $y = \frac{5}{x - 8}$ 152) _____

A) Vertical asymptote at x = 8; horizontal asymptote at y = 0
B) Vertical asymptote at x = 8; horizontal asymptote at y = 5
C) Vertical asymptote at x = -8; no horizontal asymptote
D) Vertical asymptote at x = -8; horizontal asymptote at y = 0

153) $y = \frac{-1}{x + 5}$ 153) _____

A) Vertical asymptote at x = -5; horizontal asymptote at y = 0
B) Vertical asymptote at x = 5; horizontal asymptote at y = 0
C) Vertical asymptote at x = -5; horizontal asymptote at y = -1
D) Vertical asymptote at x = 5; horizontal asymptote at y = -1

154) $y = \frac{9}{9 - 4x}$ 154) _____

A) Vertical asymptote at x = $\frac{9}{4}$ horizontal asymptote at y = 0
B) Vertical asymptote at x = 0; horizontal asymptote at y = $\frac{9}{4}$
C) Vertical asymptote at x = $\frac{9}{4}$; horizontal asymptote at y = 9
D) Vertical asymptote at x = 9; horizontal asymptote at y = $\frac{9}{4}$

155) $y = \frac{5x}{x + 5}$ 155) _____

A) Vertical asymptote at x = -5; horizontal asymptote at y = 5
B) Vertical asymptote at x = 5; horizontal asymptote at y = 5
C) Vertical asymptote at x = -5; no horizontal asymptote
D) Vertical asymptote at x = 5; horizontal asymptote at y = -5

156) $y = \frac{x + 6}{x - 9}$ 156) _____

A) Vertical asymptote at x = -9; horizontal asymptote at y = 0
B) Vertical asymptote at x = 9; horizontal asymptote at y = x
C) Vertical asymptote at x = -9; horizontal asymptote at y = 1
D) Vertical asymptote at x = 9; horizontal asymptote at y = 1

157) $y = \frac{3x + 4}{x + 1}$ 157) _____

A) Vertical asymptote at x = -1; horizontal asymptote at y = 3
B) Vertical asymptote at x = 1; horizontal asymptote at y = 3
C) Vertical asymptote at x = 3; horizontal asymptote y = -1
D) Vertical asymptote at x = -1; horizontal asymptote at y = $-\frac{4}{3}$

158) $y = \frac{-3x + 5}{15 - 3x}$ 158) _____

A) Vertical asymptote at x = 5; horizontal asymptote at y = 1
B) Vertical asymptote at x = 5; horizontal asymptote at y = - 1
C) Vertical asymptote at x = 5; horizontal asymptote at y = 3
D) Vertical asymptote at x = - 1; horizontal asymptote at y = 5

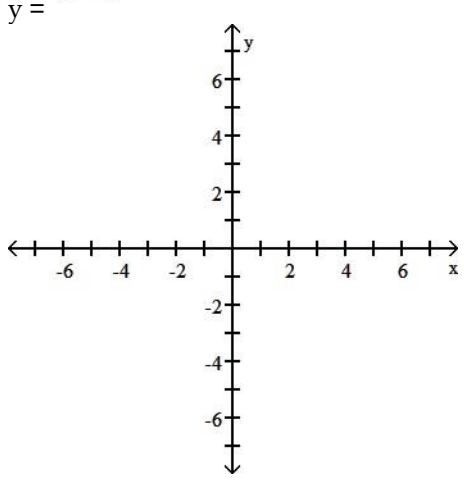
159) $y = \frac{x^2 - 16}{x - 4}$ 159) _____

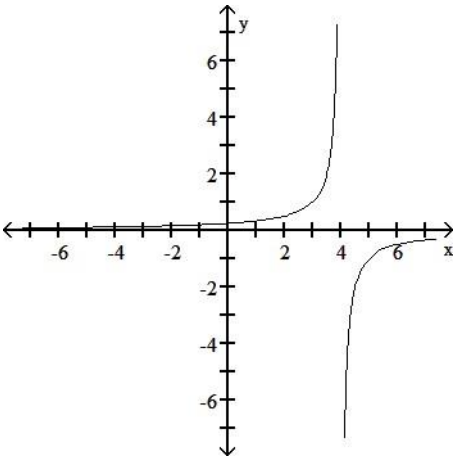
A) Vertical asymptote at x = -4; no horizontal asymptote
B) No asymptotes; hole at x = 4
C) Vertical asymptote at x = 4; no horizontal asymptote
D) No vertical asymptote; horizontal asymptote at y = 4

Graph the rational function.

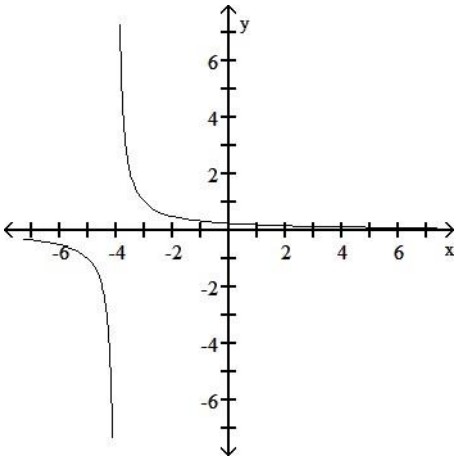
160) $y = \frac{1}{x - 4}$ 160) _____

A)

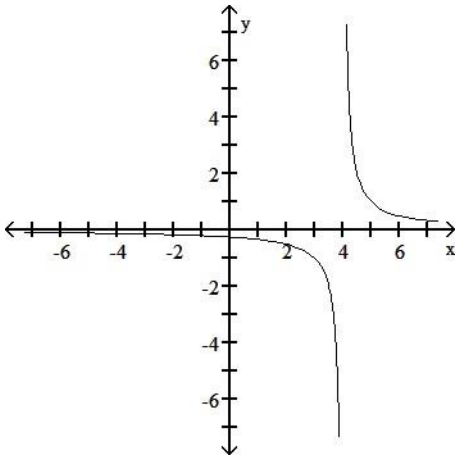




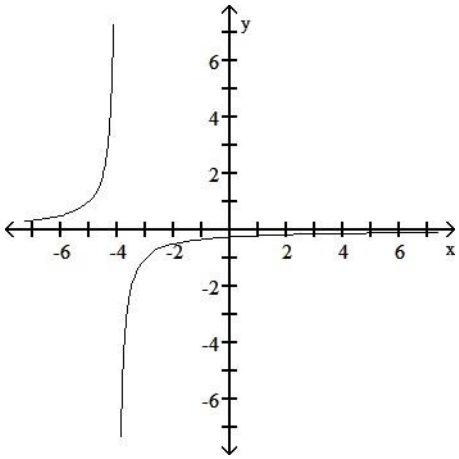
B)



C)

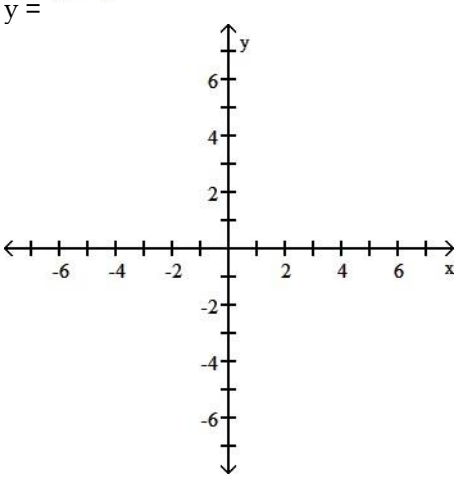


D)

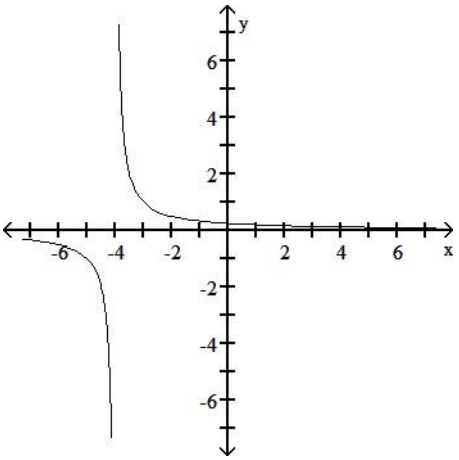


161) $y = \frac{-1}{x - 4}$

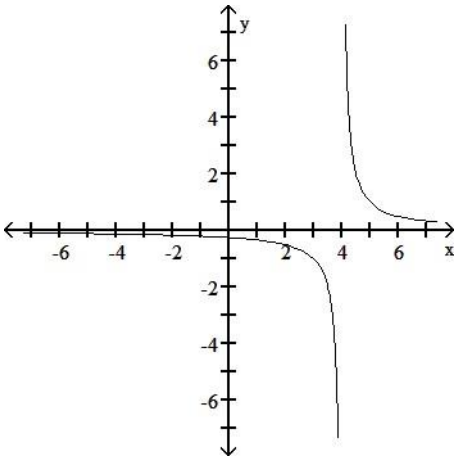
161) _____



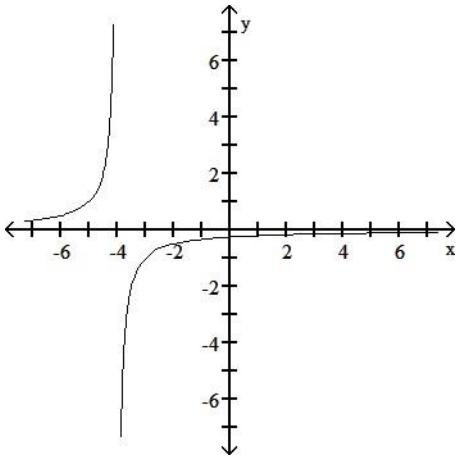
A)



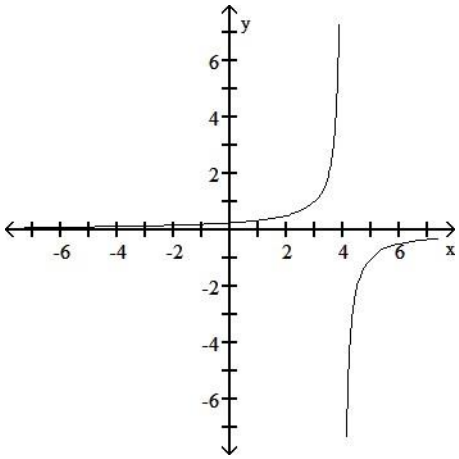
B)



C)

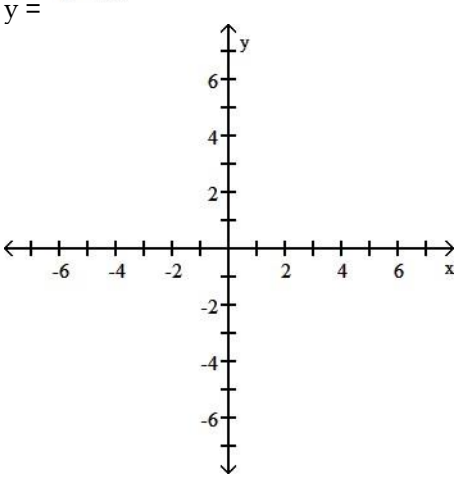


D)

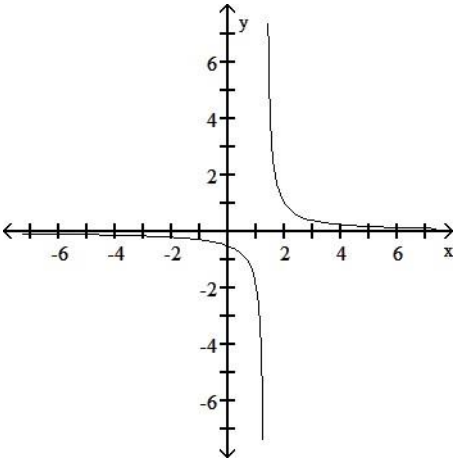


162) $y = \frac{2}{4 - 3x}$

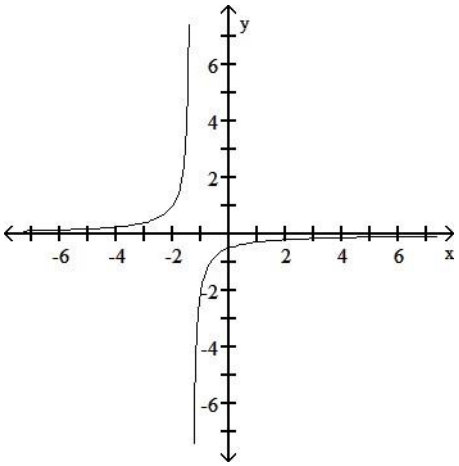
162) _____



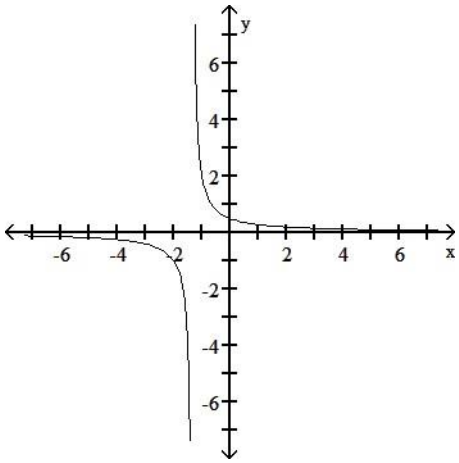
A)



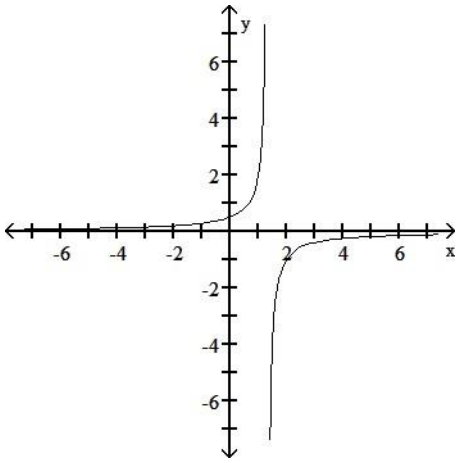
B)



C)

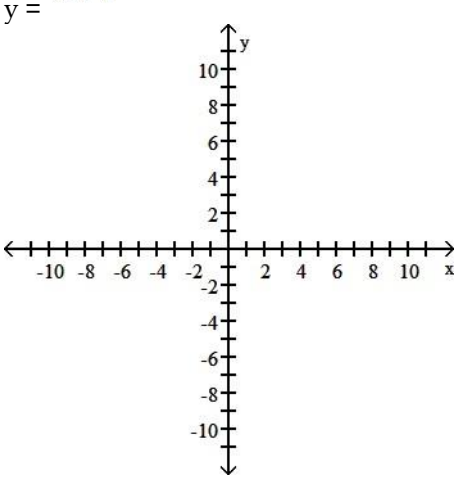


D)

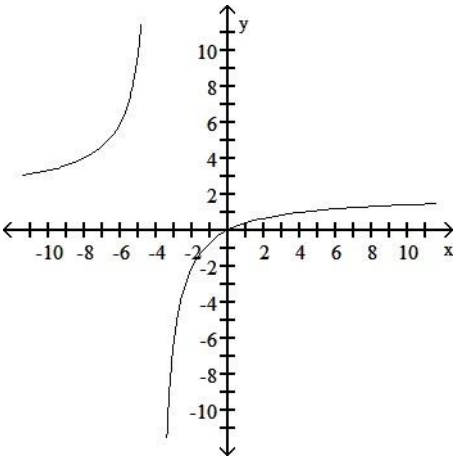


163) $y = \frac{2x}{x + 4}$

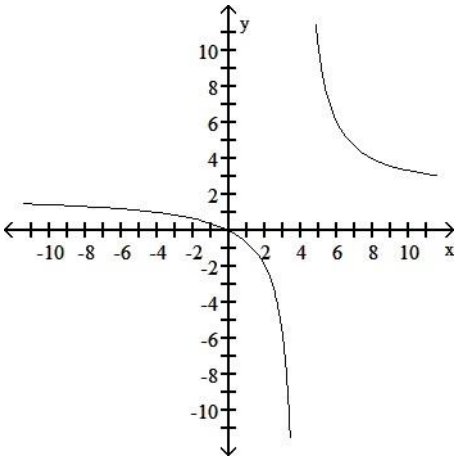
163) _____



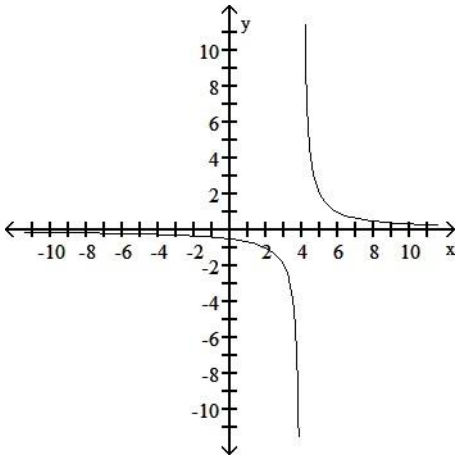
A)



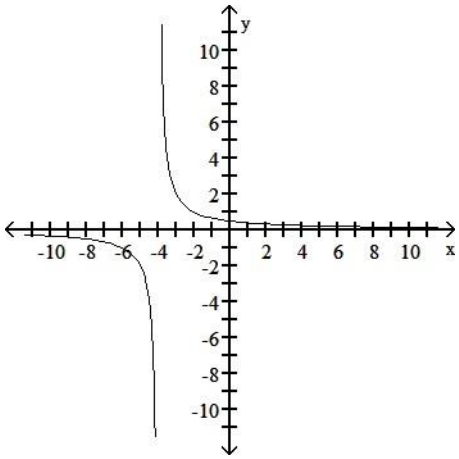
B)



C)

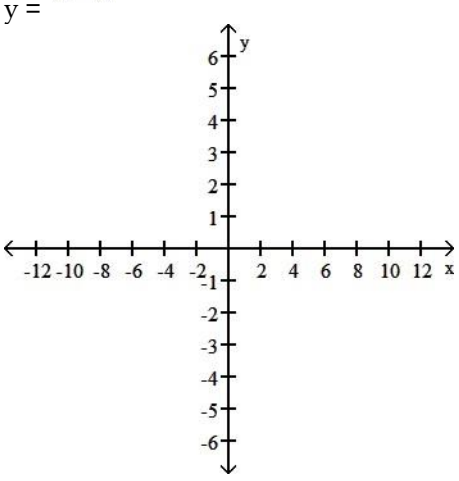


D)

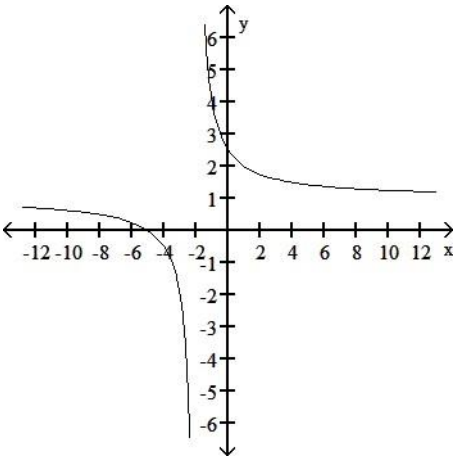


164) $y = \frac{x-5}{x-2}$

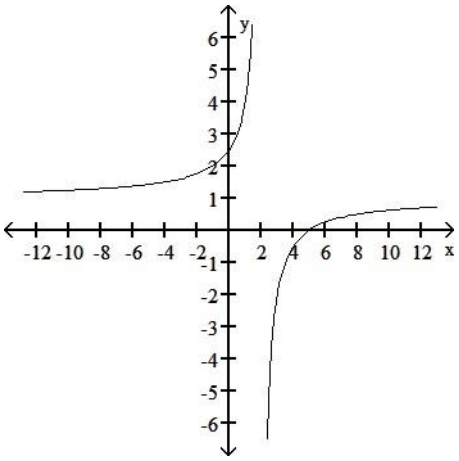
164) _____



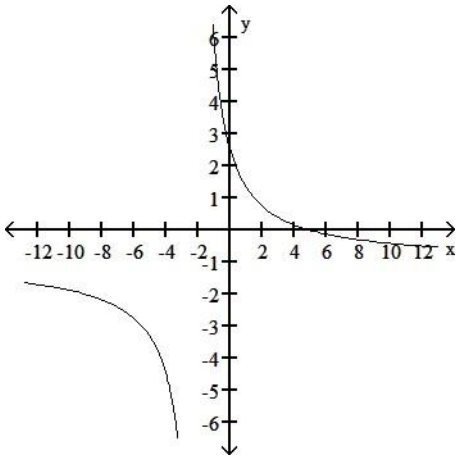
A)



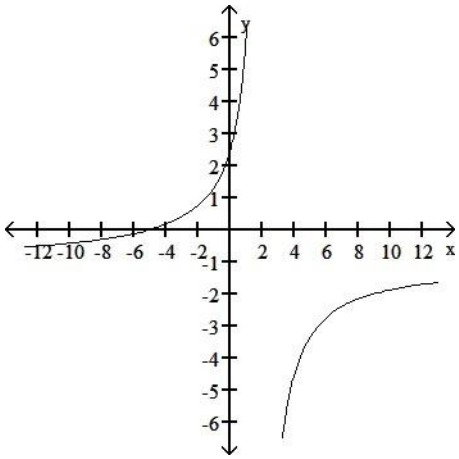
B)



C)

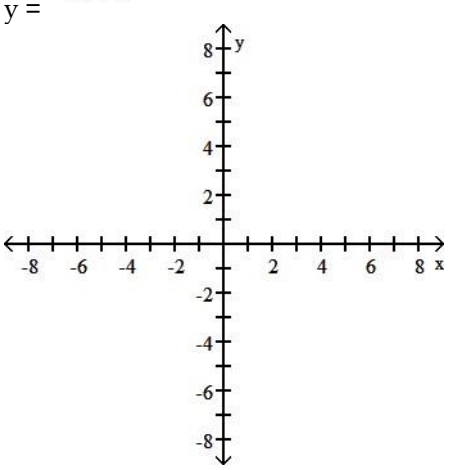


D)

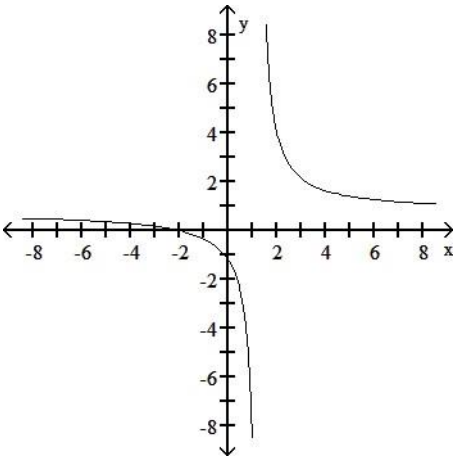


165) $y = \frac{-6 - 3x}{4x + 5}$

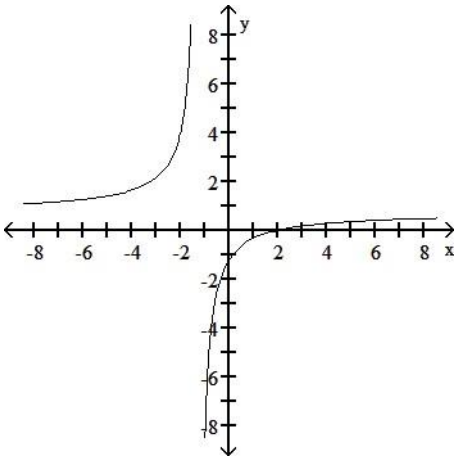
165) _____



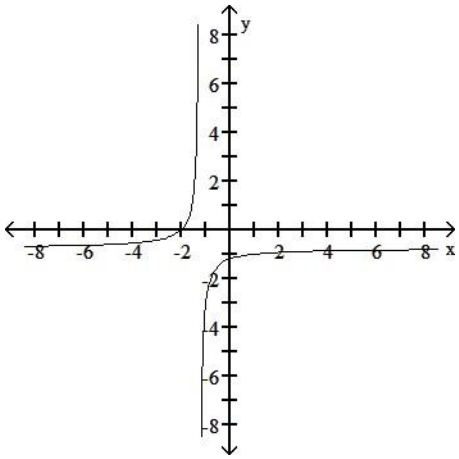
A)



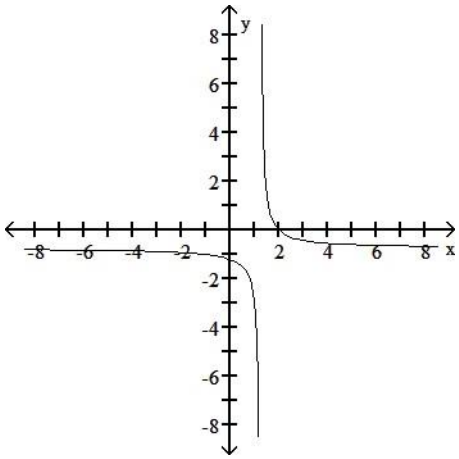
B)



C)

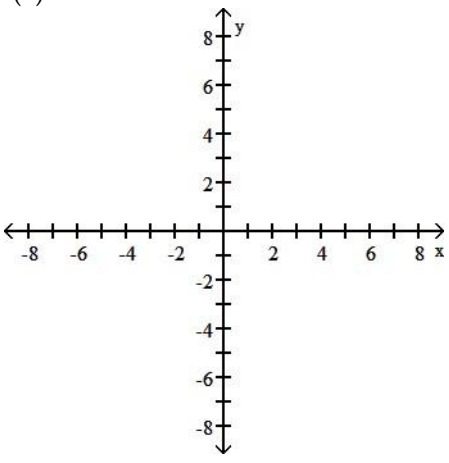


D)

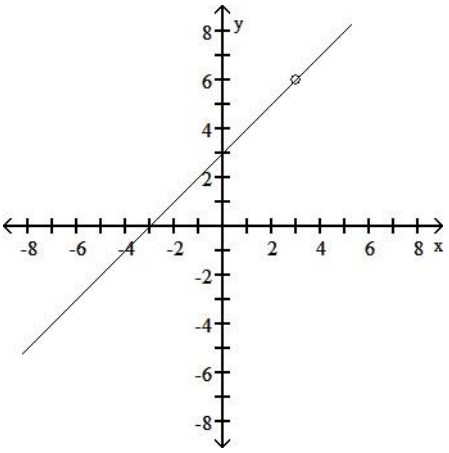


166) $f(x) = \dfrac{x^2 - 9}{x - 3}$

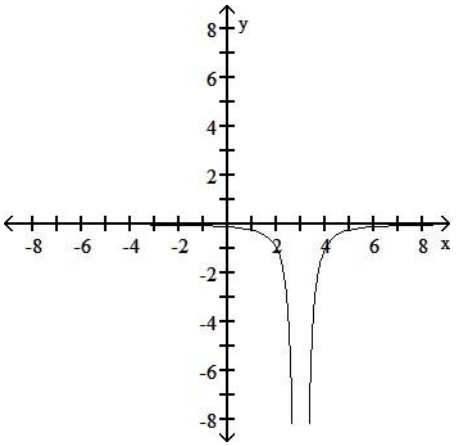
166) _____



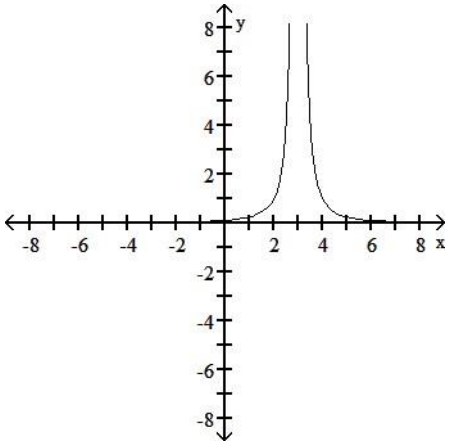
A)



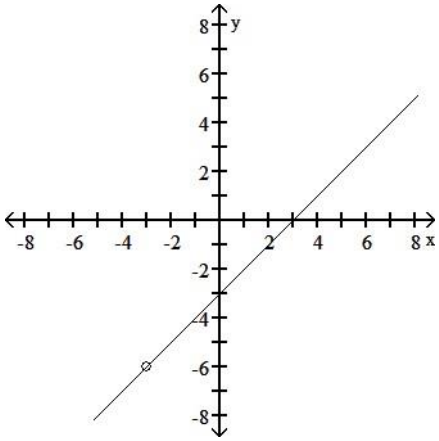
B)



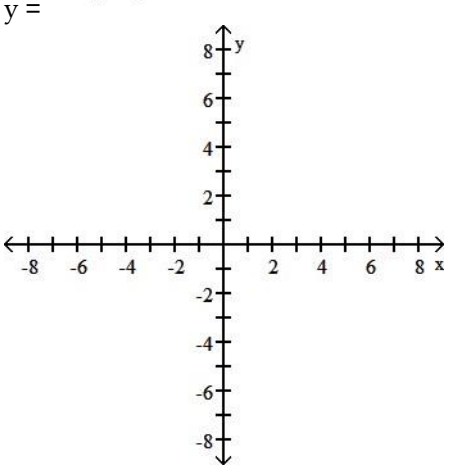
C)



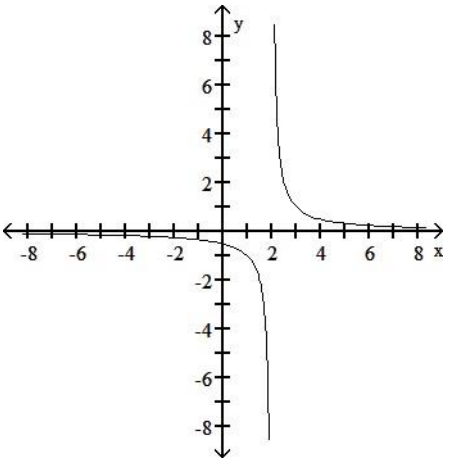
D)



167) $y = \dfrac{x^2 + 5x + 6}{x + 3}$ 167) _____



A)



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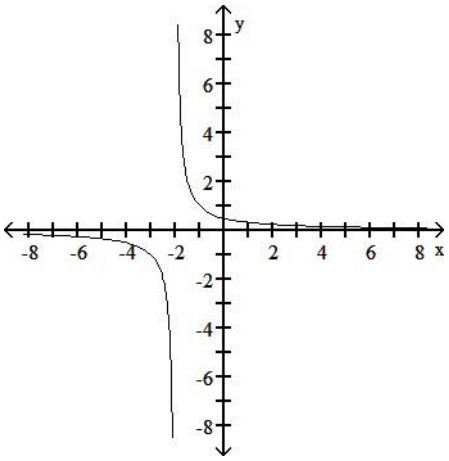
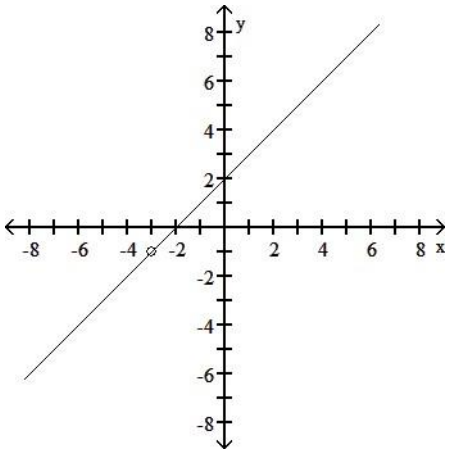
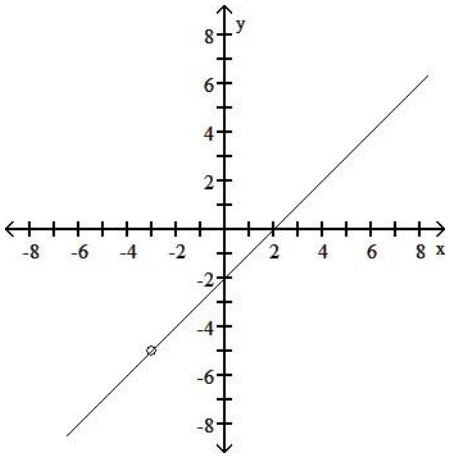


C)



D)



Solve the problem.

168) If the average cost per unit $\overline{C}(x)$ to produce x units of plywood is given by $\overline{C}(x) = \frac{1500}{x + 50}$, what is the unit cost for 20 units? 168) _____

A) $ 21.43 B) $ 25.00 C) $ 75.00 D) $ 1.50

169) If the average cost per unit $\overline{C}(x)$ to produce x units of plywood is given by $\overline{C}(x) = \frac{600}{x + 20}$, what do 200 units cost? 169) _____

A) $ 599.90 B) $ 30.00 C) $ 6000.00 D) $ 545.45

170) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by $y = \frac{312{,}500}{x + 625}$. What is the cost for x = 300? 170) _____

A) $ 337.84 B) $ 416.67 C) $ 150,000.00 D) $ 101,351.35

171) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by $y = \frac{212{,}500}{x + 425}$. What is the cost per ton for x = 50? 171) _____

A) $ 447.37 B) $ 10.00 C) $ 3825.00 D) $ 4250.00

172) Suppose the cost per ton, y, to build an oil platform of x thousand tons is approximated by

172) $y = \frac{312{,}500}{x + 625}$. What is the cost per ton for x = 300? ____

A) $ 416.67 B) $ 101,351.35 C) $ 150,000.00 D) $ 337.84

173) Suppose a cost-benefit model is given by $y = \frac{3.6x}{100 - x}$, where y is the cost in thousands of dollars for removing x percent of a given pollutant. Find the cost of removing 55% to the nearest dollar. 173) _____

A) $ 3600 B) $ 1980 C) $ 4400 D) $ 1222

174) A function that might describe the entire Laffer curve is $y = 0.5x(100 - x)(10000 - x^2)$ where y is the government revenue in hundreds of thousands of dollars from a tax of x percent, with the function valid for $0 \le x \le 100$. Find the revenue from a tax rate of 20%. Round your answer to the nearest billion. 174) _____

A) $ 738 billion B) $ 668 billion C) $ 768 billion D) $ 793 billion

175) The polynomial function $I(t) = -0.1t^2 + 1.2t$ represents the yearly income (or loss) from a real estate investment, where t is time in years. After what year does income begin to decline? 175) _____

A) 6 B) 12 C) 8.00 D) 5

176) In the following formula, y is the minimum number of hours of studying required to attain a test score of x: $y = \frac{0.36x}{100.5 - x}$. How many hours of study are needed to score 82? 176) _____

A) 1.6 hr B) 101.06 hr C) 16.00 hr D) 4.22 hr

177) The polynomial function $A(x) = -0.015x^3 + 1.05x$ gives the alcohol level in an average person's blood x hours after drinking 8 oz of 100-proof whiskey. If the level exceeds 1.5, a person is legally drunk. Would a person be drunk after 5 hours? 177) _____

A) Yes B) No

178) The polynomial function $L(p) = p^3 - 5p^2 + 20$ gives the rate of gas leakage from a tank as pressure increases in p units from its initial setting. Will an increase of 2 units result in a lower rate of leakage compared to the initial setting of $p = 0$? 178) _____

A) Yes B) No

179) The polynomial function $G(x) = -0.006x^4 + 0.140x^3 - 0.53x^2 + 1.79x$ measures the concentration of a dye in the bloodstream x seconds after it is injected. Does the concentration increase between 14 and 15 seconds? 179) _____

A) Yes B) No

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

52) A
53) A
54) B
55) C
56) D
57) A
58) A
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67) A
68) B
69) B
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94) D
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102) B
103) B

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106) C
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155) A

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159) B
160) C
161) D
162) D
163) A
164) B
165) C
166) A
167) C
168) A
169) D
170) D
171) A
172) D
173) C
174) C
175) A
176) A
177) A
178) A
179) A